Medicine

Gender differences in submission behavior exacerbate publication disparities in elite journals

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Abstract

Women are particularly underrepresented in journals of the highest scientific impact, with substantial consequences for their careers. While a large body of research has focused on the outcome and the process of peer review, fewer articles have explicitly focused on gendered submission behavior and the explanations for these differences. In our study of nearly five thousand active authors, we find that women are less likely to report having submitted papers and, when they have, to submit fewer manuscripts, on average, than men. Women were more likely to indicate that they did not submit their papers (in general and their subsequently most cited papers) to *Science, Nature*, or *PNAS* because they were advised not to. In the aggregate, no statistically significant difference was observed between men and women in how they rated the quality of their work. Nevertheless, regardless of discipline, women were more likely than men to indicate that their "*work was not ground-breaking or sufficiently novel*" as a rationale for not submitting to one of the listed prestigious journals. Men were more likely than women to indicate that the "*work would fit better in a more specialized journal.*" We discuss the implications of these findings and interventions that can serve to mitigate the disparities caused by gendered differences in submission behavior.

Significance

Publishing in high-impact scholarly journals has a significant effect on researchers' careers. Our findings identify factors that affect submission to *Science, Nature*, and the *Proceedings of the National Academy of Sciences of the United States of America* (*PNAS*) and explore whether there is a relationship between gender and desk rejections or submission rates. We found no relationship between gender and reported desk rejection and a relationship between gender and reported submissions. Women were more likely than men to indicate that their "*work was not ground-breaking or sufficiently novel*" for the listed prestigious journals and that they

were advised against submitting to these venues. Men were more likely to indicate that the "*work would fit better in a more specialized journal.*"

eLife assessment

This **convincing** study, which is based on a survey of researchers, finds that women are less likely than men to submit articles to elite journals. It also finds that there is no relation between gender and reported desk rejection. The study is an **important** contribution to work on gender bias in the scientific literature.

Introduction

The rise of the research evaluation system has created a market of intense competition for a few hallowed venues. Scientific capital is strongly concentrated in generalist journals founded in the late nineteenth and early twentieth Centuries (Baldwin, 2015), such as *Science*, *Nature*, and *Proceedings of the National Academy of Sciences of the United States of America* (PNAS). Articles published in these journals garner greater news media attention, and authors tend to receive more career opportunities and grants (Reich, 2013). Since publishing in highly influential journals leads to wider dissemination and visibility of researchers' work, the volume of manuscript submissions to these journals is high and acceptance low, with a large proportion of manuscripts rejected by editors without undergoing peer review. It is noted on *Science's* author portal that less than 7% of originally submitted papers are accepted (Science, 2023). *Nature* also notes low acceptance rates on its website, from 8-12% depending on the year, and states that "*many submissions are declined without being sent for review*" (Nature, 2023). A similar practice is espoused by the *Proceedings of the National Academy of Sciences of the United States of America (PNAS)*, with most publications rejected before peer review and a final acceptance rate of 14% (PNAS, 2023). Prestige and hierarchy among journals are not inherently negative for scholarly communication; however, if entry into these highly visible venues varies for different sociodemographic populations of authors, it may have adverse consequences for science (Kozlowski et al., 2022).

Editors and peer reviewers evaluate both the quality of manuscripts submitted as well as whether the topic fits within the scope of the journal. Idealized gatekeeping reflects the Mertonian norms of organized skepticism and universalism, evaluating scientific work independently of the social characteristics of authors (Merton, 1968). However, various critiques of scholarly peer review have been discussed (Ware, 2008), among which is a concern of social biases, that is, "differential evaluation of an author's submission as a result of her/his perceived membership in a particular social category" (Lee et al., 2013). These biases are not necessarily conscious; yet, if no biases were present in the case of peer review, then "we should expect the rate with which members of less powerful social groups enjoy successful peer review outcomes to be proportionate to their representation in *submission rates*" (Lee et al., 2013). Results on gender disparities and bias in scholarly publishing have arrived at mixed results (Borsuk et al., 2009; Day et al., 2020; Djupe et al., 2019; Edwards et al., 2018; Fox & Paine, 2019; Gilbert et al., 1994; Grossman, 2020; Helmer et al., 2017; Murray et al., 2018; Squazzoni et al., 2021; Walker et al., n.d.). However, many of these fail to disentangle components of the publication process, focusing only on the outcome of peer-reviewed publications rather than the effect of differential submission rates or desk rejections. These components have fundamentally different attributes—with one being an effect of self-selection and the other a potential indicator of bias.

Most studies focused on this have suggested that women submit fewer papers than men, with little difference in desk rejections (or a disparity in favor of women) (Bendels et al., 2018; Garand & Harman, 2021; Grossman, 2020; Martinsen et al., 2022; Squazzoni et al., 2021). The lower submission rate is particularly pronounced in the most prestigious journals (Bendels et al., 2018). Interviews with women authors explained these lower submission rates with higher selectivity: they argued that they only submit when they are confident the paper would be accepted, not wanting to risk a rejection as they have limited time for conducting research and attending to lengthy reviews (Closa et al., 2020). Women were also less likely than men to indicate that they submit their manuscripts to top journals in their field as their first choice and more likely than men to select a journal based on whether a journal is most likely to accept the manuscript (Djupe et al., 2019). Other perceptions and behavioral differences have also been postulated to account for the differences in manuscript submission behaviors, including risk aversion, perfectionism (Borghans et al., 2009; Closa et al., 2020; Djupe et al., 2019), and assessment of contribution (Lincoln et al., 2012; Wennerås & Wold, 2008). However, few large-scale studies have examined this question from the perspective of the authors. In this context, our paper seeks to address whether the sociodemographic characteristics of authors influence submission rates to elite journals. More specifically, based on a survey of more than 4,700 active authors, we assess differences in gender, academic rank, and discipline in the likelihood of submitting to *Science, Nature*, and *PNAS* and the self-reported reasons for not submitting to these journals.

Results

Journal submission behavior

Women were less likely than men to report that they submitted a paper to *Science, Nature*, or *PNAS* (48.7% of men and 37.0% of women, see SI Table 7). These differences are statistically significant (see SI Table 8), with men, in general, being more likely to submit to *Science, Nature*, or *PNAS* than women while controlling for academic rank (OR=0.61, 95% CI[0.54, 0.70]). This relationship remains significant for each discipline (see **Figure 1**), with relatively higher percentages of men in each of the disciplines submitting to these journals (ranging from 44.2% to 53.4%), compared to women (ranging from 33.5% to 37.5%). We also investigated the mean number of manuscripts that respondents reported submitting to *Science, Nature*, or *PNAS* (see **Figure 1** and SI Table 9). The mean was calculated by investigating only respondents who submitted at least one manuscript to *Science, Nature*, or *PNAS*. The number of submissions an author could have submitted depends on the discipline (due to the difference in publication behavior between disciplines) and career status (junior, senior, non-academic). In medical sciences (coefficient=-1.46, 95% CI[-2.14, -0.79]) and natural sciences and engineering (coefficient=-0.80, 95% CI[-1.39, -0.22]), women submitted fewer manuscripts than men. No statistically significant difference was observed for the social sciences (see SI Table 10).

Reported acceptance and rejection rate

We examined the difference between women and men regarding the self-reported acceptance and rejection rates for *Science, Nature*, and *PNAS*, using linear regression analysis while controlling for academic rank. The result shows no significant difference between women and men in getting their papers accepted (see **Figure 1**, SI Table 11, and SI Table 12). We also used a mixed-effect model to analyze the role of gender in the chances of getting manuscripts accepted, which yields similar conclusions to those above. We defined the desk rejection rate as the number of manuscripts that did not go out for peer review divided by the number of manuscripts rejected for each survey respondent. The relationship between desk rejection rate and gender were examined using linear regression and a mixed-effect model, again controlling for rank. Both models yield

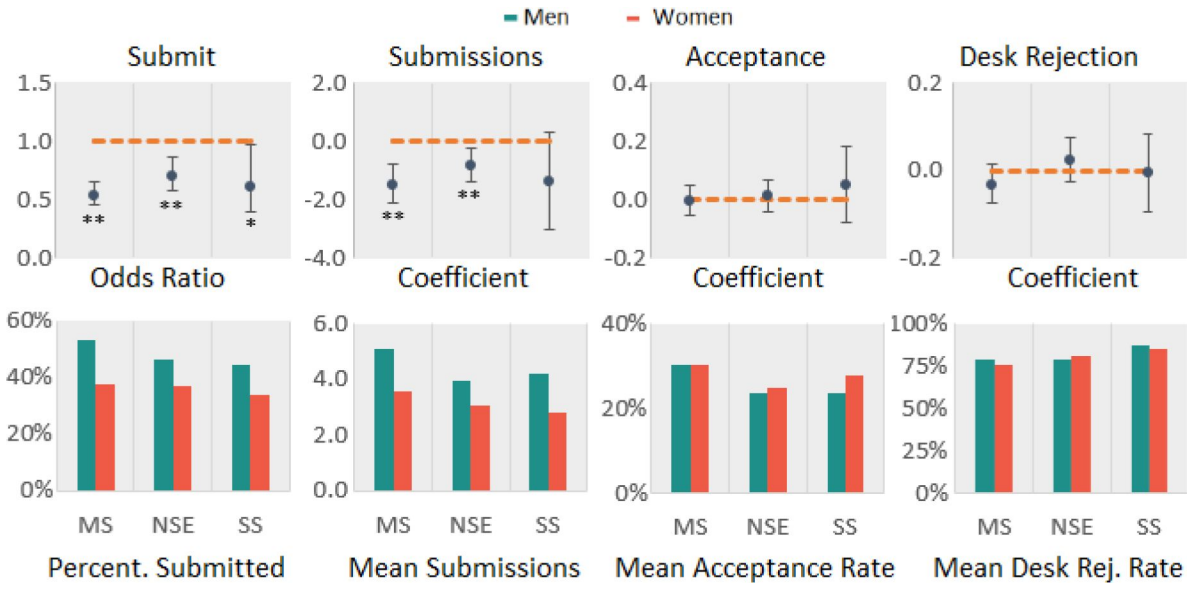

Figure 1.

Measures of submission rate, acceptance rate, and rejection rate with tests of statistical significance. Logistic regression was used for whether they submitted to an elite journal and linear regression for number of submissions, acceptance rate and desk rejection rate. All odds ratio and coefficient values are based on women over men. MS: Medical Sciences; NSE: Natural Sciences and Engineering; S.S.: Social Sciences. ** indicates $p<0.01$, * indicates $p<0.05$

similar results: gender did not significantly impact the possibility of getting a desk rejection for manuscripts submitted to these journals, as illustrated in **Figure 1** (as well as SI Table 13 and SI Table 14).

Submission and desk rejections of authors highest cited papers

To understand whether the gender differences observed above also hold for the subset of higher impact research, we investigated respondents' submission pattern for their most cited papers (not published in *Science, Nature, PNAS*, but also *Cell, Nature Communications, NEJM*, and *Science Advances*; see Methods and Materials for more details). Results show that a substantial proportion of the authors (48.6%) considered other journals than the one in which their paper was published, with no significant gender difference (see SI Table 17 and SI Table 18). However, only a small proportion of authors (9.1%) considered *Science, Nature*, or *PNAS*, again with no significant gender difference (see SI Table 19 and SI Table 20). As only a few authors considered publishing in these journals, it is not surprising to see that few authors ever submitted their most cited paper to *Science, Nature*, or *PNAS* (228 respondents), again with no significant gender gap (see SI Table 21 and SI Table 22). Similarly, no significant difference was observed in desk rejection rate for their most cited paper between men and women in any of the disciplines when submitting to *Science, Nature*, and *PNAS* (see SI Table 23 and SI Table 24). Submission behavior and the chance of getting a desk rejection for higher quality papers thus do not seem to differ significantly between men and women (**Figure 2**), although these conclusions are based on a very limited number of responses.

Perception of the quality of research

Respondents were asked to rate their perception of the quality of their research (not their papers) in comparison to their peers on a five-point Likert scale ranging from Excellent (5) to Poor (1). Most respondents rated their work as good or excellent (86.7%), regardless of discipline, with very few rating their work as poor or fair (1.0%), and only a few respondents rated it as average (12.4%) (**Figure 3** and SI Table 27). When considering responses regardless of discipline, no statistically significant difference was observed between men and women regarding how they rated the quality of their work (see SI Table 28). When disaggregating the respondents by discipline, it was found that compared with the men, women in the natural sciences and engineering are more likely to rank their research quality lower (OR=0.83, 95% CI[0.67, 0.99]). No statistically significant difference was observed in the medical and social sciences.

Reasons for not submitting to elite journals

We also investigated the authors' rationale for why they did not submit their manuscripts (in general and their most cited) to the selected journals by asking respondents to select from a list of potential reasons. The results of the regression analysis are represented in **Figure 4**. None of the respondents with a known academic rank indicated that they did not submit to the journals because they were unaware of the journals. The most common reason men and women gave was that their work would fit better in a more specialized journal.

Two of the listed reasons are related to the quality and the novelty of the research. Women in natural sciences and engineering were more likely than men to indicate that "*the work was not of high enough quality*" as one of the reasons why they did not submit to *Science, Nature*, or *PNAS* (OR=1.59, 95% CI[1.22, 2.08]). A similar finding was also found for the most cited paper, although only significant in the medical sciences (OR=0.75, 95% CI[0.60, 0.94]). Regardless of discipline, women were more likely than men to (OR=1.26, 95% CI [1.07, 1.50]) indicate that they consider their "*work was not ground-breaking or sufficiently novel*" for the journal in question. For their

Figure 2.

Measures of journal consideration, submission rate, and desk rejection rate for most cited papers with odds ratios (women/men). MS: Medical Sciences; NSE: Natural Sciences and Engineering; S.S.: Social Sciences. SNP: Science, Nature, PNAS.

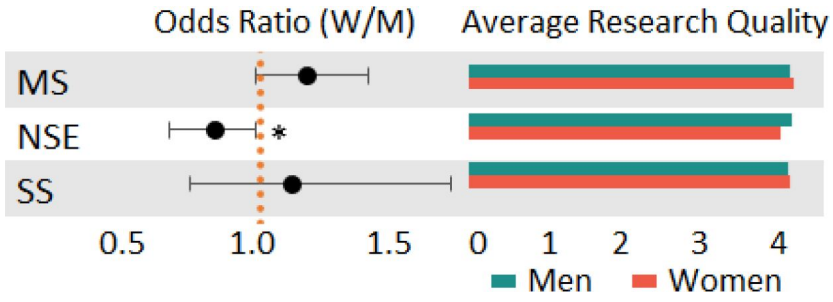

Figure 3.

Odds ratio (women/men) and mean value for research quality comparison with peers. MS: Medical Sciences; NSE: Natural Sciences and Engineering; S.S.: Social Sciences. *Indicates $p<0.05$

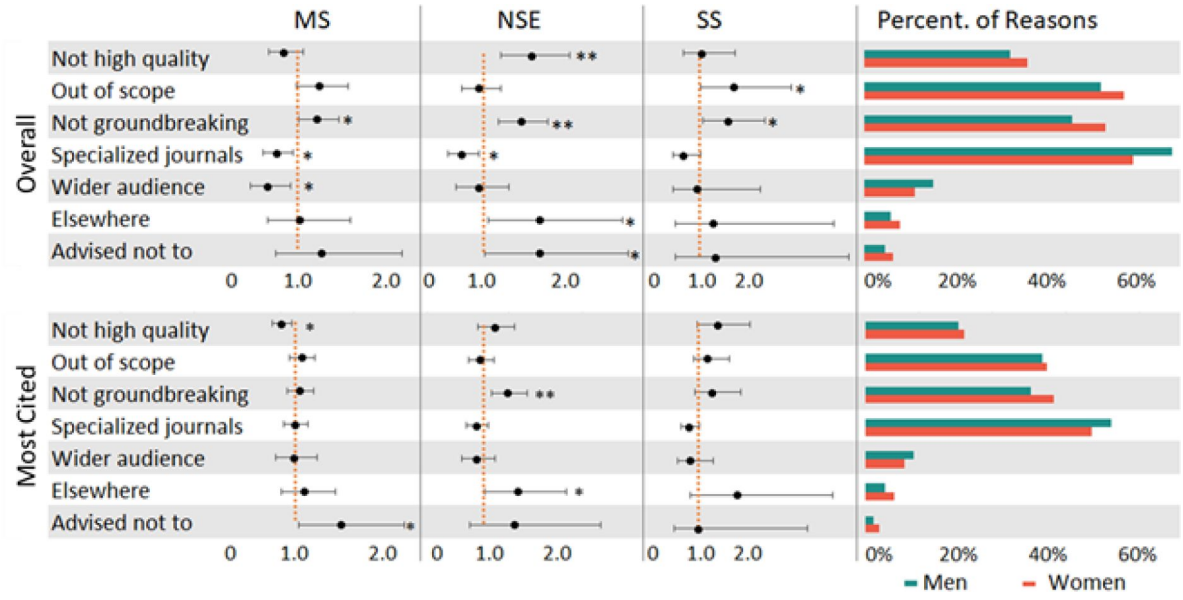

Figure 4.

Reasons for not submitting to top journals, overall and most cited paper, with odds ratios (women/men). MS: Medical Sciences; NSE: Natural Sciences and Engineering; S.S.: Social Sciences. ** indicates p<0.01, * indicates p<0.05

most cited papers, it was also the case for authors publishing in natural sciences and engineering (OR=1.36, 95% CI[1.10, 1.67), as well as all disciplines combined (OR=1.19, 95% CI[1.04, 1.37]) (see SI Table 16 and SI Table 26).

Reasons related to the scope and audience of the journals mostly show non-significant gender differences, with one exception. In general, men were more likely than women to indicate that the "*work would fit better in a more specialized journal*" for their general submissions (OR=0.72, 95% CI[0.60, 0.85]). When disaggregated by discipline, a significant difference was observed both for the medical sciences (OR=0.74, 95% CI[0.57, 0.95]) and for the natural sciences and engineering (OR=0.72, 95% CI[0.55, 0.95]). However, no statistically significant difference was observed for the most cited papers. Men in the medical sciences were also more likely than women to indicate that the "*work would reach a wider audience in another journa*l" (OR=0.61, 95% CI[0.41, 0.92]). No statistically significant difference was observed for the most cited papers. In contrast to the above results, women submitting in the social sciences were more likely to indicate that the "*work fell out of the scope of the journal*" (OR=1.84, 95% CI[1.03, 3.28]).

The last two reasons are much less frequent and relate to the wishes of the co-authors and the advice received. In the natural sciences and engineering, women were more likely than men to indicate that their co-authors wished to submit elsewhere (OR=1.70, 95% CI[1.06, 2.74]). This was also the case for their most cited paper (OR=1.57, 95% CI[1.02, 2.40]). Without disaggregating by discipline, women were more likely to indicate that they did not submit their papers (in general and their most cited papers) to *Science*, *Nature*, or *PNAS* because they were advised not to. When disaggregating by discipline, this difference was also observed for respondents in natural sciences and engineering for their papers in general (OR=1.69, 95% CI[1.02, 2.81]) and for medical sciences respondents for their most cited papers (OR=1.75, 95% CI[1.05, 2.93]).

Discussion and Conclusion

Women are particularly underrepresented in journals of the highest scientific impact (Huang et al., 2020), with substantial consequences for their careers. While a large body of research has focused on the outcome and the process of peer review, fewer articles have explicitly focused on gendered submission behavior and the explanations for these differences. In our study of nearly five thousand active authors, we find that women are less likely to report having submitted papers and, when they have, to submit fewer manuscripts, on average, than men. This reinforces much of the literature demonstrating lower submission rates among women (Bendels et al., 2018; Grossman, 2020; Martinsen et al., 2022; Squazzoni et al., 2021). One strategy might be to introduce quotas into peer review; however, this has been shown to have negative effects on women (Leibbrandt et al., 2018). Another strategy might be to optimize around homophily: women editors tend to disproportionately select women reviewers (Helmer et al., 2017), and women reviewers are more favorable to women-authored work (Murray et al., 2018). The positive reinforcement in the process will increase women reviewers and authors, which may influence submission behavior on the broader network.

There is a demonstrated relationship between self-efficacy and publication output (Hemmings & Kay, 2009); however, our results on this were mixed. In the aggregate, no statistically significant difference was observed between men and women in how they rated the quality of their work. A difference was only observed in the natural sciences and engineering, where women ranked their research quality lower. The latter is particularly interesting, given that women tend to outperform in Engineering on several indicators (Ghiasi et al., 2015). The weak signal observed suggests that no particular intervention may be necessary to improve self-efficacy for this population; however, there may be some internalization of value premised on past experiences in peer review. Therefore, addressing larger issues of bias in evaluation may serve to mitigate any gendered differences in self-efficacy.

Regardless of discipline, women were more likely than men to indicate that their "*work was not ground-breaking or sufficiently novel*" for the listed prestigious journals. Men were more likely than women to indicate that the "*work would fit better in a more specialized journal.*" Women were more likely to indicate that they did not submit their papers (in general and their most cited papers) to *Science, Nature*, or *PNAS* because they were advised not to. These results may reinforce the notion of risk aversion and perfectionism (Closa et al., 2020), suggesting that women have a higher internal standard for what constitutes novel research. However, the more alarming result is that women seem to be deterred from submitting from people within their scholarly network. One interpretation could be that the work is truly not sufficiently novel; this would suggest that men are innately predisposed to higher novelty research designs or that they are trained in this manner. Given no evidence of the former and sufficient evidence of differential mentoring for women (Nolan et al., 2008), it would stand to reason that greater attention should be made to equity in research training. However, the alternative interpretation is that women are not receiving the simple encouragement necessary to seek out higher-impact venues. Research administrators may seek simple interventions to increase this support. Journal editors may also want to consider dedicated outreach to women-led labs. Addressing gender disparities in science requires a multifaceted approach that considers all components of the scientific system. Given that publishing is a cornerstone of this system and central to research evaluation, addressing mechanisms that create disparities in journal submission—be they self-imposed or otherwise—is essential for creating a robust and responsible research ecosystem.

Materials and methods

A survey was conducted to explore the relationship between author gender and manuscript submission, rejection, and acceptance rates for high-impact, multidisciplinary journals in physical sciences, life sciences, and engineering (see S.I. appendix for the questionnaire). This study focuses on the results for *Science, Nature*, and *PNAS*. The target population consisted of active authors who published articles from 2008 to 2017 in journals indexed by WoS in medical sciences, natural sciences and engineering, and social sciences (Table S2). The questionnaire asked respondents to report on their manuscript submission experiences. It included a subsection focusing on their most cited paper not published in selected elite journals, i.e., *Science, Nature, PNAS* (which are analyzed in the main manuscript), as well as *Cell, Nature Communications, NEJM*, and *Science Advances* (which are analyzed in the S.I. appendix). Specific questions addressed their experiences submitting their most cited manuscripts to these journals, as well as their experiences submitting to these journals in general. Stata software (Standard Edition 17) was used to conduct the analyses, which consisted of applying ordinal logistic regression, multinomial logistic regression, and multiple logistic regression with a significance level or alpha of 0.05. Although we collected data on genders other than men and women, the independent variable studied is a binary gender variable (i.e., women or men), given the low number of respondents outside these two categories. Respondents were disaggregated by academic rank (i.e., junior, senior, or non-academic, excluding all unknowns) and discipline (i.e., social sciences, medical sciences, and natural sciences and engineering). More details about the regression analysis can be found in the appendix. The sample consisted of 6,002 respondents who participated in the survey, of whom 4,857 finished the questionnaire. An analysis of the attrition failed to identify a common point of departure, suggesting individual variability in dropout rather than failed survey construction. The final number of respondents in this study is 4,805, after the removal of 19 responses in Arts and Humanities and additional responses due to a lack of information for critical variables. Of the final number of respondents, 4,740 (98.6%) have a known academic rank and are included in the regression analysis (more details available in the S.I. appendix SI Table 6).

Data availability

All data needed to evaluate the conclusions in the paper are present in the paper and the Supporting information. Aggregated and de-identified data by gender, discipline, and rank for analyses are available on GitHub (*https://github.com/UWMadisonMetaScience/genderPublishing*).

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Reviewer #1 (Public Review):

Summary

This paper summarises responses from a survey completed by around 5,000 academics on their manuscript submission behaviours. The authors find several interesting stylised facts, including (but not limited to):

- Women are less likely to submit their papers to highly influential journals (*e.g.*, Nature, Science and PNAS).
- Women are more likely to cite the demands of co-authors as a reason why they didn't submit to highly influential journals.
- Women are also more likely to say that they were advised not to submit to highly influential journals.

Recommendation

This paper highlights an important point, namely that the submissions' behaviours of men and women scientists may not be the same (either due to preferences that vary by gender, selection effects that arise earlier in scientists' careers or social factors that affect men and women differently and also influence submission patterns). As a result, simply observing gender differences in acceptance rates---or a lack thereof---should not be automatically interpreted as as evidence of for or against discrimination (broadly defined) in the peer review process. I do, however, make a few suggestions below that the authors may (or may not) wish to address.

Major comments

What do you mean by bias?

In the second paragraph of the introduction, it is claimed that "if no biases were present in the case of peer review, then 'we should expect the rate with which members of less powerful social groups enjoy successful peer review outcomes to be proportionate to their representation in submission rates." There are a couple of issues with this statement.
- First, the authors are implicitly making a normative assumption that manuscript submission and acceptance rates *should* be equalised across groups. This may very well be the case, but there can also be important reasons why not -- e.g., if men are more likely to submit their less ground-breaking work, then one might reasonably expect that they experience higher rejection rates compared to women, conditional on submission.
- Second, I assume by "bias", the authors are taking a broad definition, i.e., they are not only including factors that specifically relate to gender but also factors that are themselves independent of gender but nevertheless disproportionately are associated with one gender or another (e.g., perhaps women are more likely to write on certain topics and those topics are rated more poorly by (more prevalent) male referees; alternatively, referees may be more likely to accept articles by authors they've met before, most referees are men and men are more likely to have met a given author if he's male instead of female). If that is the case, I would define more clearly what you mean by bias. (And if that isn't the case, then I would encourage the authors to consider a broader definition of "bias"!)

Identifying policy interventions is not a major contribution of this paper

In my opinion, the survey evidence reported here isn't really strong enough to support definitive policy interventions to address the issue and, indeed, providing policy advice is not a major -- or even minor -- contribution of your paper, so I would not mention policy interventions in the abstract. (Basically, I would hope that someone interested in policy interventions would consult another paper that much more thoughtfully and comprehensively discusses the costs and benefits of various interventions!)

Minor comments

- What is the rationale for conditioning on academic rank and does this have explanatory power on its own---i.e., does it at least superficially potentially explain part of the gender gap in intention to submit?

Reviewer #2 (Public Review):

Summary:
In this manuscript, Basson et al. study the representation of women in "high-impact" journals through the lens of gendered submission behavior. This work is clear and thorough, and it provides new insights into gender disparities in submissions, such as that women were more likely to avoid submitting to one of these journals based on advice from a colleague/mentor. The results have broad implications for all academic communities and may help toward reducing gender disparities in "high-impact" journal submissions. I enjoyed reading this article, and I have several recommendations regarding the methodology/reporting details that could help to enhance this work.

Strengths:
This is an important area of investigation that is often overlooked in the study of gender bias in publishing. Several strengths of the paper include:

1. A comprehensive survey of thousands of academics. It is admirable that the authors retroactively reached out to other researchers and collected an extensive amount of data.
2. Overall, the modeling procedures appear thorough, and many different questions are modeled.
3. There are interesting new results, as well as a thoughtful discussion. This work will likely spark further investigation into gender bias in submission behavior, particularly regarding the possible gendered effect of mentorship on article submission.

Weaknesses:

1. The GitHub page should be further clarified. A detailed description of how to run the analysis and the location of the data would be helpful. For example, although the paper says that "Aggregated and de-identified data by gender, discipline, and rank for analyses are available on GitHub," I was unable to find such data.
2. Why is desk rejection rate defined as "the number of manuscripts that did not go out for peer review divided by the number of manuscripts rejected for each survey respondent"? For example, in your Grossman 2020 reference, it appears that manuscripts are categorized as "reviewed" or "desk-rejected" (Grossman Figure 2). If there are gender differences in the denominator, then this could affect the results.
3. Have you considered correcting for multiple comparisons? Alternatively, you could consider reporting P-values and effect sizes in the main text. Otherwise, sometimes the conclusions can be misleading. For example, in Figure 3 (and Table S28), the effect is described as significant in Social Sciences (p=0.04) but not in Medical Sciences (p=0.07).

4. More detail about the models could be included. It may be helpful to include this in each table caption so that it is clear what all the terms of the model were. For instance, I was wondering if journal or discipline are included in the models.

Reviewer #3 (Public Review):

Summary:
This is a strong manuscript by Basson and colleagues which contributes to our understanding of gender disparities in scientific publishing. The authors examine attitudes and behaviors related to manuscript submission in influential journals (specifically, Science, Nature and PNAS). The authors rightly note that much attention has been paid to gender disparities in work that is already published, but this fails to capture the unseen hurdles that occur prior to publication (which include decisions about where to publish, desk rejections, revisions and resubmissions, etc.). They conducted a survey study to address some of these components and their results are interesting:

They find that women are less likely to submit their manuscript to Science, Nature or PNAS. While both men and women feel their work would be better suited for more specialized journals, women were more likely to think their work was 'less novel or groundbreaking.'

A smaller proportion of respondents indicated that they were actively discouraged from submitting their manuscripts to these journals. In this instance, women were more likely to receive this advice than men.

Lastly, the authors also looked at self-reported acceptance and rejection rates and found that there were no gender differences in acceptance or rejection rates.

These data are helpful in developing strategies to mitigate gender disparities in influential journals.

Comments:
The methods the authors used are appropriate for this study. The low response rate is common for this type of recruitment strategy. The authors provide a thoughtful interpretation of their data in the Discussion.

Reviewer #4 (Public Review):

This manuscript covers an important topic of gender biases in the authorship of scientific publications. Specifically, it investigates potential mechanisms behind these biases, using a solid approach, based on a survey of researchers.

Main strengths

The topic of the MS is very relevant given that across sciences/academia representation of genders is uneven, and identified as concerning. To change this, we need to have evidence on what mechanisms cause this pattern. Given that promotion and merit in academia are still largely based on the number of publications and impact factor, one part of the gap likely originates from differences in publication rates of women compared to men.

Women are underrepresented compared to men in journals with high impact factor. While previous work has detected this gap, as well as some potential mechanisms, the current MS provides strong evidence, based on a survey of close to 5000 authors, that this gap might be due to lower submission rates of women compared to men, rather than the rejection rates. The data analysis is appropriate to address the main research aims. The results interestingly show that there is no gender bias in rejection rates (desk rejection or overall) in three high-impact journals (Science, Nature, PNAS). However, submission rates are lower for women compared to men, indicating that gender biases might act through this pathway. The survey

also showed that women are more likely to rate their work as not groundbreaking, and be advised not to submit to prestigious journals

With these results, the MS has the potential to inform actions to reduce gender bias in publishing, and actions to include other forms of measuring scientific impact and merit.

Main weakness and suggestions for improvement

1. The main message/further actions: I feel that the MS fails to sufficiently emphasise the need for a different evaluation system for researchers (and their research). While we might act to support women to submit more to high-impact journals, we could also (and several initiatives do this) consider a broader spectrum of merits (e.g. see https://coara.eu/). Thus, I suggest more space to discuss this route in the Discussion. Also, I would suggest changing the terms that imply that prestigious journals have a better quality of research or the highest scientific impact (line 40: journals of the highest scientific impact) with terms that actually state what we definitely know (i.e. that they have the highest impact factor). And think this could broaden the impact of the MS

2. Methods: while methods are all sound, in places it is difficult to understand what has been done or measured. For example, only quite late (as far as I can find, it's in the supplement) we learn the type of authorship considered in the MS is the corresponding authorship. This information should be clear from the very start (including the Abstract).

Second, I am unclear about the question on the perceived quality of research work. Was this quality defined for researchers, as quality can mean different things (e.g. how robust their set-up was, how important their research question was)? If researchers have different definitions of what quality means, this can cause additional heterogeneity in responses. Given that the survey cannot be repeated now, maybe this can be discussed as a limitation.

I was surprised to see that discipline was considered as a moderator for some of the analyses but not for the main analysis on the acceptance and rejection rates.

I was also suppressed not to see publication charges as one of the reasons asked for not submitting to selected journals. Low and middle-income countries often have more women in science but are also less likely to support high publication charges.

Finally, academic rank was asked of respondents but was not taken as a moderator.