Authorship policies of scientific journals

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ABSTRACT

We analysed the authorship policies of a random sample of 600 journals from the Journal Citation Reports database. 62.5% of the journals we sampled had an authorship policy. Having an authorship policy was positively associated with impact factor. Journals from the biomedical sciences and social sciences/humanities were more likely to have an authorship policy than journals from the physical sciences, engineering or mathematical sciences. Among journals with a policy, the most frequent type of policy was guidance on criteria for authorship (99.7%); followed by guidance on acknowledgments (97.3%); requiring that authors make substantial contributions to the research (94.7%); requiring that authors be accountable for the research as a whole (84.8%); guidance on changes in authorship (77.9%); requiring that authors give final approval to the manuscript (77.6%); requiring that authors draft or critically revise the manuscript (71.7%); providing guidance on corporate authorship (58.9%); prohibiting gift, guest or ghost authorship (31.7%); requiring authors to describe their contributions (5.3%); limiting the number of authors for some types of articles (4.0%) and requiring authors to be accountable for their part in the research (1.1%). None of the policies addressed equal contribution statements. Journals that do not have authorship policies should consider adopting or developing ones.

INTRODUCTION

Authorship on scientific papers is one of the most contentious issues in research ethics.[1–5] Because authorship is important for career advancement, peer recognition and prestige, disputes often arise about who may be named as an author on a paper. One of the factors driving the steady increase in the number of authors per paper since the 1960s is the desire to receive authorship credit for career advancement.[5] The pressure to name someone as an author on a paper who has not made a significant contribution, but has helped in other ways or is considered an expert in their field, can lead to an ethical problem known as honorary authorship.[5] A survey conducted by Wislar *et al* found that 17.6% of 896 articles published in six top medical journals during the 2008 calendar year had honorary authors.[6] Ghost authorship, that is, failing to name someone as an author who has made a significant contribution, is also an ethical concern.[5] Wislar *et al* also found that 7.9% of articles published in medical journals have ghost authors.[6] One of the main reasons individuals who have made significant contributions may be omitted from the authorship list is to hide or obscure financial relationships to private companies. In one study, 75% of papers reporting the results of industry-initiated clinical trials had ghost authors.[7]

To promote integrity and accountability concerning authorship, scientific journals have developed authorship policies or revised existing ones. Many biomedical journals follow the authorship guidelines adopted by the International Committee of Medical Journal Editors (ICMJE).[8] ICMJE has revised its guidelines several times in the past decade to address issues relating to drafting, editing and accountability. The current version recommends that authorship be based on meeting the following four criteria:

> Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; AND
>
> Drafting the work or revising it critically for important intellectual content; AND
>
> Final approval of the version to be published; AND
>
> Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.[9]

Although several previously published studies have examined the authorship policies of scientific journals, they have not addressed some important authorship issues.[8 10–12] For example, an increasing number of journals allow authors to declare that two or more individuals have made equal contributions to the research. Akhabue and Lautenbach published a study in 2010 showing that the percentage of articles with equal contribution statements has increased dramatically in five top medical journals since the beginning of the 21st century.[13] Their study found that the percentage of articles listing equal contributors in the *Journal of the American Medical Association* increased from 0% to 7.5% from 2000 to 2009, and the percentage in the *New England Journal of Medicine* increased from 1% to 8.6% during the same period.[13] Other studies have obtained similar results.[14 15] It is not known how many journals provide guidance on this practice. It is important for journals to provide guidance if they allow manuscripts to state that some authors have contributed equally to avoid abuse of this practice. The 'contributed equally' designation might be used to allow someone to add a first-author publication to their curriculum vita even though their contribution has been less than the other author named as contributing equally.[16] The 'contributed equally' designation should honestly and accurately reflect scientific contributions and should not be used only for career advancement.

Another important question not addressed by previous studies is the percentage of journals that require authors to describe their contributions to

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the research. Numerous commentators have argued that requiring authors to describe their contributions will help to prevent honorary and ghost authorship and other problems because it encourage authors to be more honest and accountable.[1 2 5 17 18] However, it is not known how many journals have heeded this advice.

The aim of our study was to (1) conduct a comprehensive survey of the authorship policies of scientific journals that examines key issues related to authorship and (2) determine whether having (or not having) an authorship policy is associated with journal impact factor or field of research.

METHODS

We obtained a random sample of 600 journals from the 2013 Thompson-Reuters Journal Citation Reports (JCR) database, which includes the world's leading scientific journals.[19] We chose 600 as a target sample size based on previous experience with similar research on journal policies.[20] To obtain this sample, we selected 453 of 8539 journals from JCR Science Edition and 200 of 3080 from the JCR Social Science Edition to ensure that there would be adequate representation from different sciences, since the social sciences are underrepresented in the Science Edition. The random list was generated using an online tool for generating random sequences of numbers.[21] We independently searched journal websites for their information on author/contributor or journal policies, then compared and combined this information into a master author policy document. We began examining the first 600 journals from our sample (ordered alphabetically). If a journal had no information for authors or journal policies on its website or did not refer us to another website, we contacted the editors. If we were unable to obtain information for authors or journal policies from the website (or referral) or by contacting the editors, or the journal was no longer publishing, we replaced the journal with the next journal from our list so that we would have data from 600 journals. We made a total of 12 replacements. We examined the information for authors or journal policies to determine whether they included authorship policies. We defined an authorship policy as a policy that provides guidance on the criteria for authorship or places restrictions on authorship. We did not consider policies concerning permissions, copyrights, author rights, author affiliations, prior publication or plagiarism to be authorship policies. If the website text was not in English, we used Google Translate. We translated 10 websites. We developed a system for coding authorship policies based on an analysis of key authorship issues discussed in the research ethics literature and an initial review of the data.[4 5 17 22] Two of us independently coded the policies. These coders resolved their disagreements after inter-rater agreement had been assessed statistically. We also obtained information about journal impact factor and field of research (ie, biomedical sciences, physical sciences and engineering, social sciences and humanities, mathematical sciences) from JCR.

Inter-rater agreement of the initial assessments was evaluated using kappa statistics. After rater disagreements were resolved, χ^2 tests, or Fisher's exact test if expected frequencies were small in a category, were used to test the significance of associations between type of science and each feature of authorship policy. Mean impact factor scores were compared between journals having and not having each authorship policy feature using two-sample t tests; unequal variances t tests were used if variances were significantly different (at $p<0.05$). Mean impact factor scores were compared across types of science using analysis of variance. p Values were two-sided and considered significant if <0.05.

RESULTS

The mean impact factor of the journals was 1.91 (SD 2.65; range: 0–30.43). 40.3% of the journals were biomedical, followed by social sciences and humanities (34.3%), physical sciences and engineering (16.7%), mathematical sciences (8.3%) and general science (0.3%). 62.5% of the journals had an authorship policy. Biomedical journals had the highest percentage of journals with an authorship policy (66.5%), followed by social sciences and humanities (65.5%), physical sciences and engineering (54.0%) and mathematical sciences (50.0%) (see table 1). Journals from the biomedical and social sciences and humanities were more likely to have an authorship policy than journals from the physical sciences and engineering or mathematical sciences ($p=0.0305$). Journals that had an authorship policy had a significantly higher mean impact factor (2.20) than those without a policy (1.43) ($p=0.006$).

Among journals with a policy, the most frequent type of policy was a policy on criteria for authorship (99.7%); followed by acknowledgments (97.3%); requiring that authors make substantial contributions to the research (94.7%); requiring that authors be accountable for the research as a whole (84.8%); guidance on changes in authorship (77.9%); requiring that authors give final approval to the manuscript (77.6%); requiring that authors draft of critically revise the manuscript (71.7%); providing guidance on corporate authorship (58.9%); prohibiting gift, guest or ghost authorship (31.7%); requiring authors to describe their contributions (5.3%); limiting the number of authors for some types of articles (4.0%) and requiring authors to be accountable for their part in the research (1.1%). None of the policies addressed equal contribution statements. The source of authorship policies was publisher (40.7%), followed by professional organisation (11.0%) and journal (10.8%) (see table 1).

Inter-rater agreement for coding the policies was high (over 85% for each item). Kappa statistics also showed significant agreement between the two raters ($p<0.001$ for all items having adequate variation in responses (ie, at least 5% of responses in each category).

DISCUSSION

Most of the journals in our sample (62.5%) had an authorship policy. This percentage is much higher than the percentage reported by Salamat and coauthors[12] for Iranian medical journals (15%), slightly higher than the 59% reported by Wager for journals that belong to the World Association of Medical Editors,[8] but slightly lower than the 64.5% reported by Jaykaran and coauthors for Indian medical journals.[11] The study by Schriger and coauthors[10] did not establish the prevalence of authorship policies among a sample of journals but analysed the authorship policies among journals with a policy. While it is comforting to know that most scientific journals have an authorship policy, there is still room for improvement, especially among journals from the physical sciences/engineering or mathematical sciences and lower impact journals, which had a significantly lower percentage of authorship policies.

Consistent with the survey conducted by Schriger and coauthors,[10] we found significant variation in authorship guidance among journals with a policy, with 12 different types of policies being adopted by one or more journals. Four of the most common authorship policies—requiring that authors make substantial contributions to the research, requiring that authors be accountable for the research as a whole, requiring that authors give final approval to the manuscript, and requiring that authors draft of critically revise the manuscript—are similar to ICMJE

Table 1 Authorship policies of scientific journals

Overall journal impact factor	
Mean	1.91 (SD 2.65)
Range	0–30.43
Mean impact factor of journals with an authorship policy	2.20 (SD 2.77)
Mean impact factor of journal without an authorship policy	1.43 (SD 2.37)
Type of science	
Biomedical	242 (40.3%)
Social sciences and humanities	206 (34.3%)
Physical sciences and engineering	100 (16.7%)
Mathematical sciences	50 (8.3%)
General science	2 (0.3%)
Journal has authorship policy	375/600 (62.5%)
Having an authorship policy by type of science	
Biomedical sciences	161/242 (66.5%)
Social sciences and humanities	135/206 (65.5%)
Physical sciences and engineering	54/100 (54.0%)
Mathematical sciences	25/50 (50.0%)
General science	0/2 (0.0%)
Authorship policy characteristics (n=375)	
Source of authorship policy	
Publisher	244 (65.1%)
Professional organisation	66 (17.6%)
Journal	65 (17.3%)
Policy provides guidance on authorship criteria	374 (99.7%)
Policy provides guidance on acknowledgments	365 (97.3%)
Policy requires that authors make substantial contributions	355 (94.7%)*
Policy requires that authors be accountable for the research as a whole	318 (84.8%)*
Policy provides guidance on changes in authorship	292 (77.7%)
Policy requires that authors give final approval to the manuscript:	291 (77.6%)*
Policy requires that authors draft of critically revise the manuscript	269 (71.7%)*
Policy provides guidance on corporate authorship	221 (58.9%)
Policy prohibits gift, guest or ghost authors	119 (31.7%)
Policy requires that authors describe their contributions	20 (5.3%)
Policy limits the number of authors for some types of articles	15 (4.0%)
Policy requires that authors be accountable for their part in the research	4 (1.1%)
Policy provides guidance on equal contribution statements	0 (0.0%)

*Similar to International Committee of Medical Journal Editors' authorship criteria.

criteria for authorship. Since the ICMJE is a large organisation with significant influence over publication ethics in biomedicine, it is not surprising that most of the biomedical journals with authorship policies closely followed ICMJE criteria.

A significant finding of our study is that none of the journals with authorship policies addressed the use of equal contribution statements. This is a disconcerting discovery, since, as we noted earlier, the use of equal contribution statements is increasing in science, but it also raises ethical issues related to honesty and fairness.[16] We recommend that journals that have not adopted a policy on equal contribution statements consider developing one to promote ethics and integrity in scientific publication. The policy should provide authors with some guidance on what counts as an 'equal' contribution, since equality could be based on the quality or quantity of the author's contribution to the research.

Another significant finding is that a very low percentage of journals with a policy required authors to describe their contributions (5.33%). Although some journal families, such as Nature Publishing Group,[23] require authors to describe their contributions, it appears that most scientific journals have been slow to adopt this idea or have not even considered it. We recommend that journals that do not require authors to describe their contributions to consider adopting such a policy to promote ethics and integrity in scientific publishing.

Two statistical associations are worth noting. First, a significantly higher percentage of journals from the biomedical and social sciences/humanities had an authorship policy as compared with journals from the physical sciences/engineering or mathematical sciences. A possible explanation for this difference is that journals from the biomedical sciences and social sciences/humanities have encountered more issues related to authorship than journals from the physical sciences/engineering or mathematical sciences, which has led them to develop policies. Second, the mean impact factor for journals with an authorship policy was significantly higher than the mean impact factor for journals without a policy. A possible explanation for the relationship between impact factor and policy development is that journals with higher impact factors may confront more issues related to publication ethics than those with lower impact factors, which has led higher impact journals to develop more comprehensive authorship policies. Higher impact factor journals may encounter more ethics issues than lower impact factor journals because more is a stake (ie, prestige, status) when one publishes in a high impact factor journal. However, we would like to stress that our explanations for these statistical associations are speculative, and more research is needed on the factors that influence journal policy development.

The most significant limitation of our study is that our findings may not generalise to journals not listed in the JCR because we drew our random sample from JCR journals. Since JCR focuses on the top scientific journals, journals not included in the JCR may be less likely to have authorship policies than those included in JCR. However, we would need to collect data on non-JCR journals to know whether this is true. In any case, we do not consider this to be a significant limitation because the JCR is a large database with over 11 000 journals listed, and it covers many different areas of scientific research.

In conclusion, our findings strengthen the argument in favour of scientific journals adopting or developing clear and comprehensive authorship guidelines to promote integrity in research.[4 5 8 17]

Contributors DBR designed the study, interpreted data and drafted the manuscript. AMT collected and interpreted data and drafted the manuscript. JRB collected and interpreted data and drafted the manuscript. GK analysed data and drafted the manuscript.

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