Thoughts on Publishing Survey - how can we improve scientific publishing?

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Abstract

There are various pathways for scientists to share their work, but the most important method is the peer-reviewed manuscript. Lately, publishing in academic journals has become more competitive and time consuming, but fraudulent work and errors still occur in many journals. We propose an alternative publishing model that fits within our current model and could improve access to readers and support more efficient review. The goal of thoughts on publishing survey (TOPS) is to measure satisfaction levels of the current publishing model, propose an alternative publishing model, obtain feedback on the new model, and learn more about quality scientific articles and peer review. With this feedback, we highlight some areas that may improve publishing, for the reader, writer, and reviewer. We also assess the acceptance of an alternative model and identify ways that it could be implemented. Whatever scientific publishing may look like in the future, consumers and producers of these works should keep the goal in mind: "How can we make the peer-reviewed manuscript fit our workload and budget, and improve its value and reach to foster scientific advancement?"

Introduction

The unit of scientific currency is the peer-reviewed manuscript. Published manuscripts function to share recent findings, but also are measures of productivity, progress, and prestige. The manuscript originated in bound journals, with updates issued at regular intervals to inform fellow researchers and interested readers. This model worked well a century ago, but with the internet improving communication in nearly every way, scientific publishing seems out of date.[1] We believe that the current publishing model can be improved.

In current practice, scientific articles are read and reviewed by a small group of experts, which ultimately determines their legitimacy. However, this review system is inefficient and does not always filter out sub-par manuscripts. Illegitimate articles are published regularly[2–4], and predatory journals (for-profit journals with questionable peer-review) continue to thrive. Detailed peer review is necessary for maintaining accurate and quality scientific records. Scientific peer review is an optional duty for scientists and it can often be difficult to find reviewers.[5,6] Thus, articles can take months to become published.

Access to scientific articles, which are often aimed to improve human quality of life, are restricted from the majority of people around the world. Readers must have institutional access to published works (which can cost thousands of dollars per journal) or pay access fees per article (which add up quickly). This problem becomes exaggerated by the fact that most science is funded by taxpayer dollars. Open Access[7–9] publishing improves the visibility of scientific works, however paying publishing fees is difficult to impossible for students, early-career scientists, and/or scientists in low-GDP nations. Furthermore, Open Access publishing does not address the issue of reviewer fatigue.

An Alternative Idea

What if scientific articles could be read and reviewed by any scientist in the world? Perhaps they could comment on and raise questions about scientific information. Moderators could affirm and verify the legitimacy of comments to maintain respectful and task-oriented discussion. Authors could address or defend the points of discussion, thus improving the overall quality of the work. Then, once a specific threshold of community ratings are met, the article could become eligible for a more in-depth peer review. Experts in that field of study would then peer-review the article and assign an additional rating to the article. The scientific publication could then have 2 ratings: one by the community and one from peer-review.

The article would be a living document with version control. Changes could only be made by the authors, and all changes and comments could be seen by anyone. Readers would not only see the most up-to-date version of every article, but also see how and why changes were made. Scientists wouldn't have to wait months to get their articles out to the community. Demand for peer-reviewers would decrease, potentially decreasing reviewer fatigue and improving the efficiency of formal peer-review.

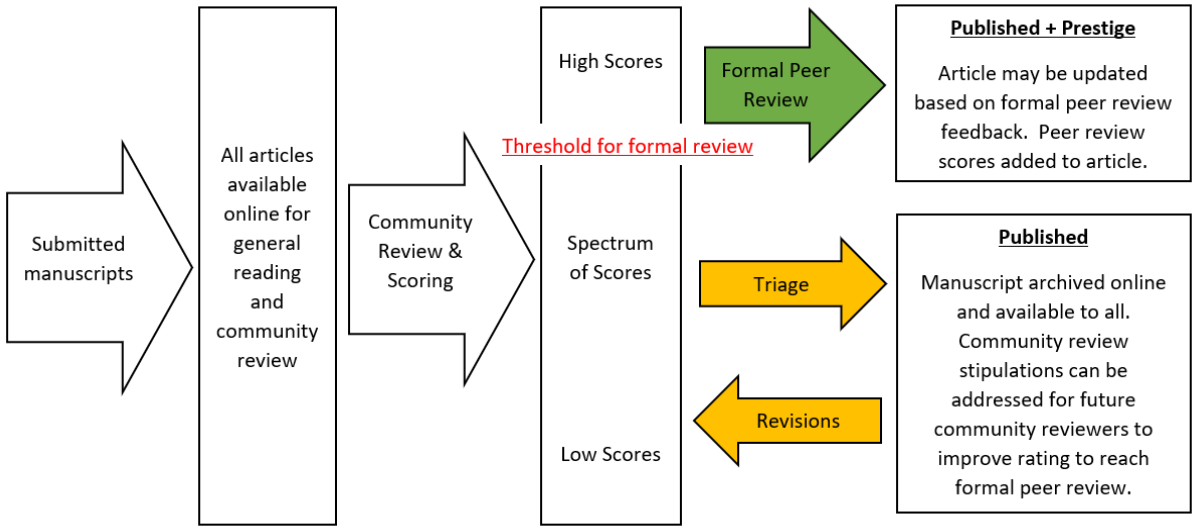

Figure 1: A schematic on how community review may reduce the burden on peer-reviewers. By unloading some of the formal peer review work, manuscripts could be scored informally, and only top scoring manuscripts would move on to formal peer review. Manuscripts below the scoring threshold for formal review could be revised and re-scored if formal peer review is desired.

We understand this new method would not be simple to implement. To function correctly it would require a mass customary change and need wide implementation. In addition, there would be many hurdles to maintain quality content and unbiased review. However, we started by getting feedback on this idea and identifying other potential ways to improve the current state of scientific publishing. The goal of thoughts on publishing survey (TOPS) is to measure satisfaction levels of the current publishing model, propose an alternative publishing model, obtain feedback on the new model, and learn more about quality scientific articles and peer review.

Methods

To assess current thoughts on publishing and obtain initial feedback on a new method, a survey was created using REDCap (Research Electronic Data Capture). Exemption of human subjects research was provided by the local institutional review board (COMIRB). After initial development and testing, TOPS was sent out to friends and colleagues by email. Links to the survey were also shared via Twitter and LinkedIn. TOPS can be found at https://is.gd/TOPSurvey. Results to survey questions are compared on a qualitative bases, by generalizing the overall responses. Graphical representation of all responses is provided for reference.

Participants and Recruiting

To date (July 15, 2019), 36 participants completed the survey. The participants average age was in the upper 30s with a range from the low 20s to low 60s. Twenty-four of the participants selected scientist as their occupation, while 8 were students, and 4 were other professionals (retired, assistant to the department head, academic physical therapist, and clinical academic). Most of the group (26)

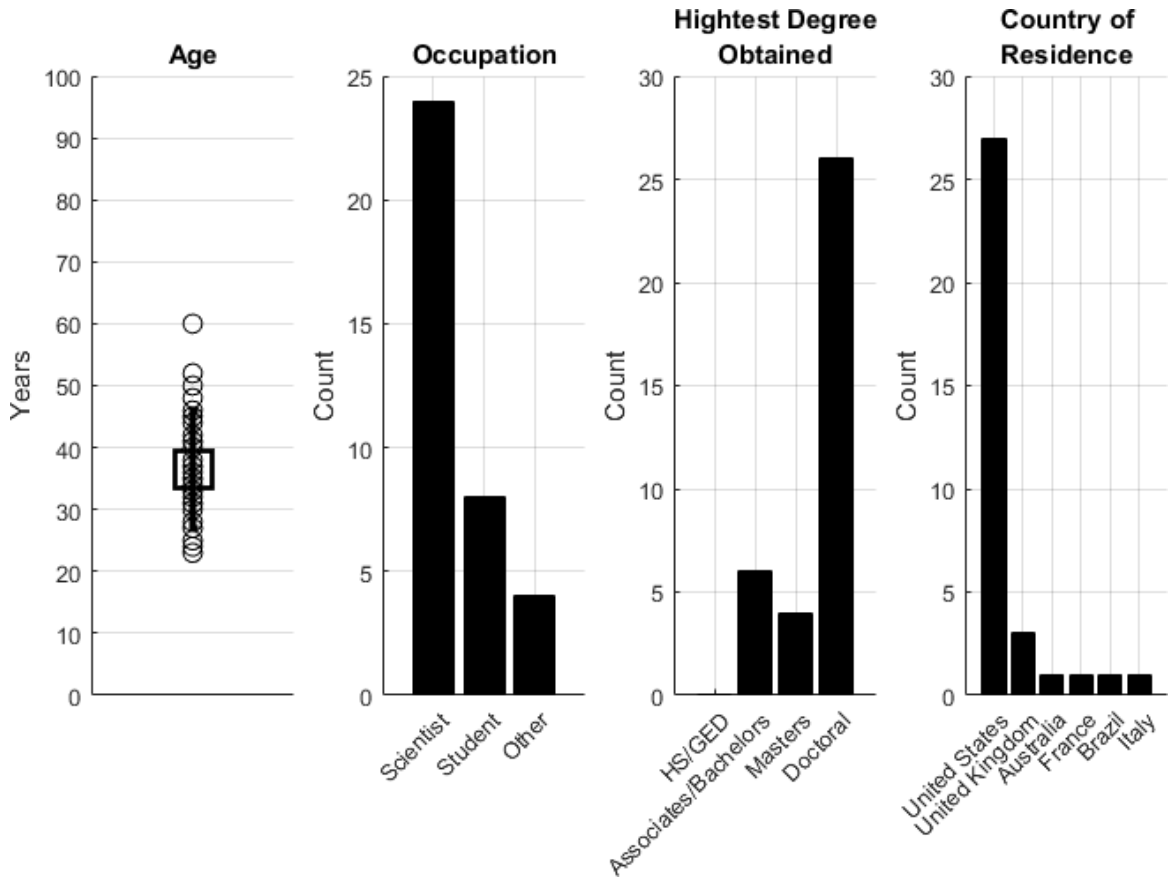

Figure 2: Group demographics for Thoughts on Publishing Survey participants.

held doctorate degrees with a few master's degrees (4) and Associates or Bachelors (6). The majority of the participants lived in the United States, but there were some international participants. Graphic representation of participant demographics can be seen in Figure 2.

Results and Discussion

Satisfaction with the current publishing model

Satisfaction with the current publishing model was mixed and varied by question and category (Figures 3 & 4). In general: the group:

- was somewhat satisfied with current access to subscription-based journal articles
- was overall satisfied with finding and reading open access articles
- was unsatisfied with the submission costs for open access
- seemed unaware or had no experience with pre-print publishing, but those with experience were neither satisfied or unsatisfied overall
- had mixed satisfaction levels on the ability to quickly and simply disseminate research findings
- had mixed satisfaction levels on the submission process
- was somewhat satisfied with revising manuscripts
- was somewhat satisfied with reviewing manuscripts.

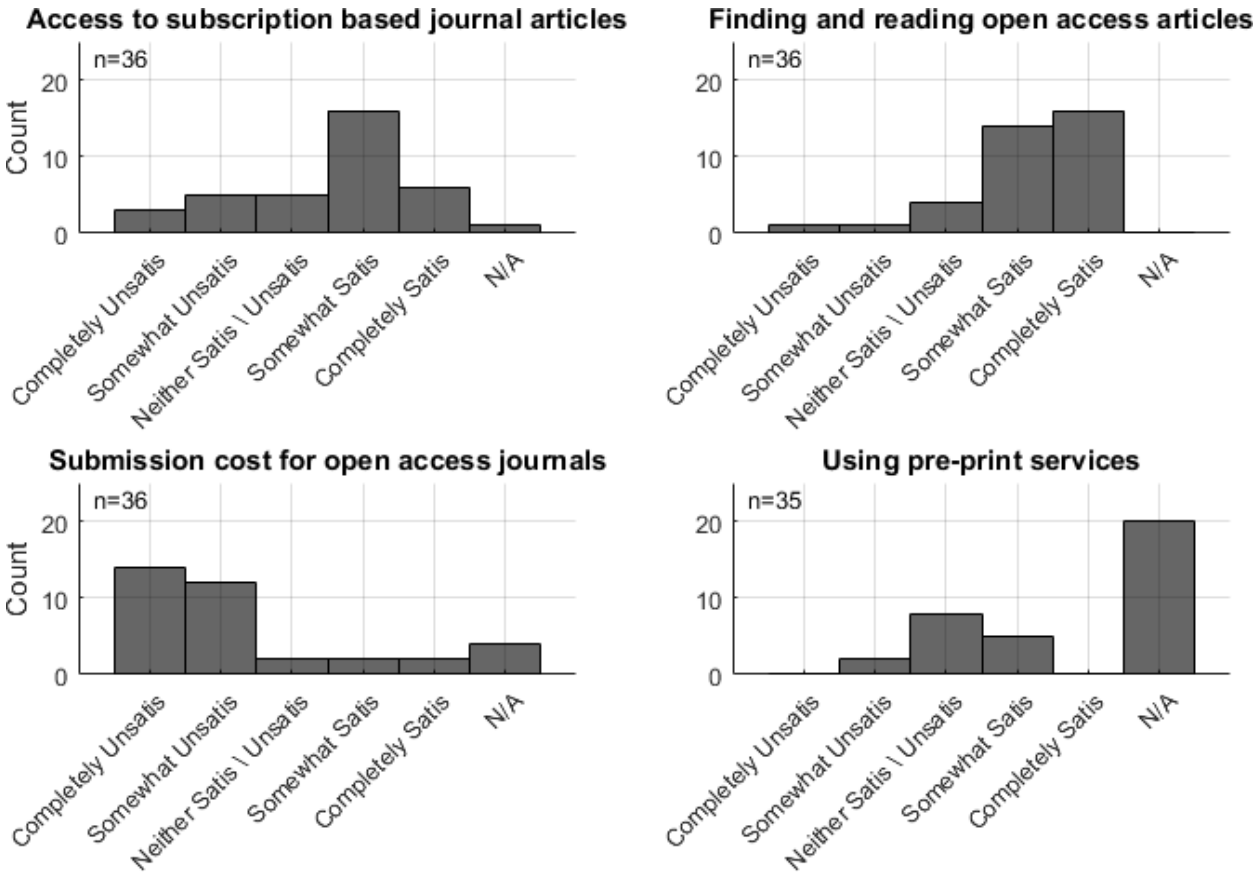

Figure 3: Satisfaction levels of the current publishing model - Access

The largest point of dissatisfaction was the submission cost of open access (Figure 3). Open access publications are a growing option and are becoming mandatory for publicly funded research. However, the fees associated with gold open access are cost-prohibitive for many scientists and students. Pre-print or green open access publishing is becoming more common but is not widely used. Another noteworthy finding is that the respondents who did have experience with pre-prints, were in general neither satisfied nor unsatisfied with them. This tells us that pre-print publishing is not bad, but it can be better.

There were mixed satisfaction levels for the ability to quickly share research findings. There are other ways to share research findings (lectures, twitter, conferences, editorials, etc.) but the peer-reviewed manuscript is the typical research output and thus is perhaps the most influential metric towards scientific prestige and success. Throughout this article, we assume that the peer-reviewed manuscript will continue to be the unit of scientific currency.

The article submission process also has room for improvement. While the specific inconveniences are likely multifactorial, we speculate that a large reason may be related to the different procedures for each journal that authors submit to. Standardizing the submission process (additional required documents, citation styles, conflict of interest statements, maximum word counts, etc.) may relieve many of these pain points. This would be very hard to establish across all disciplines, journals, and

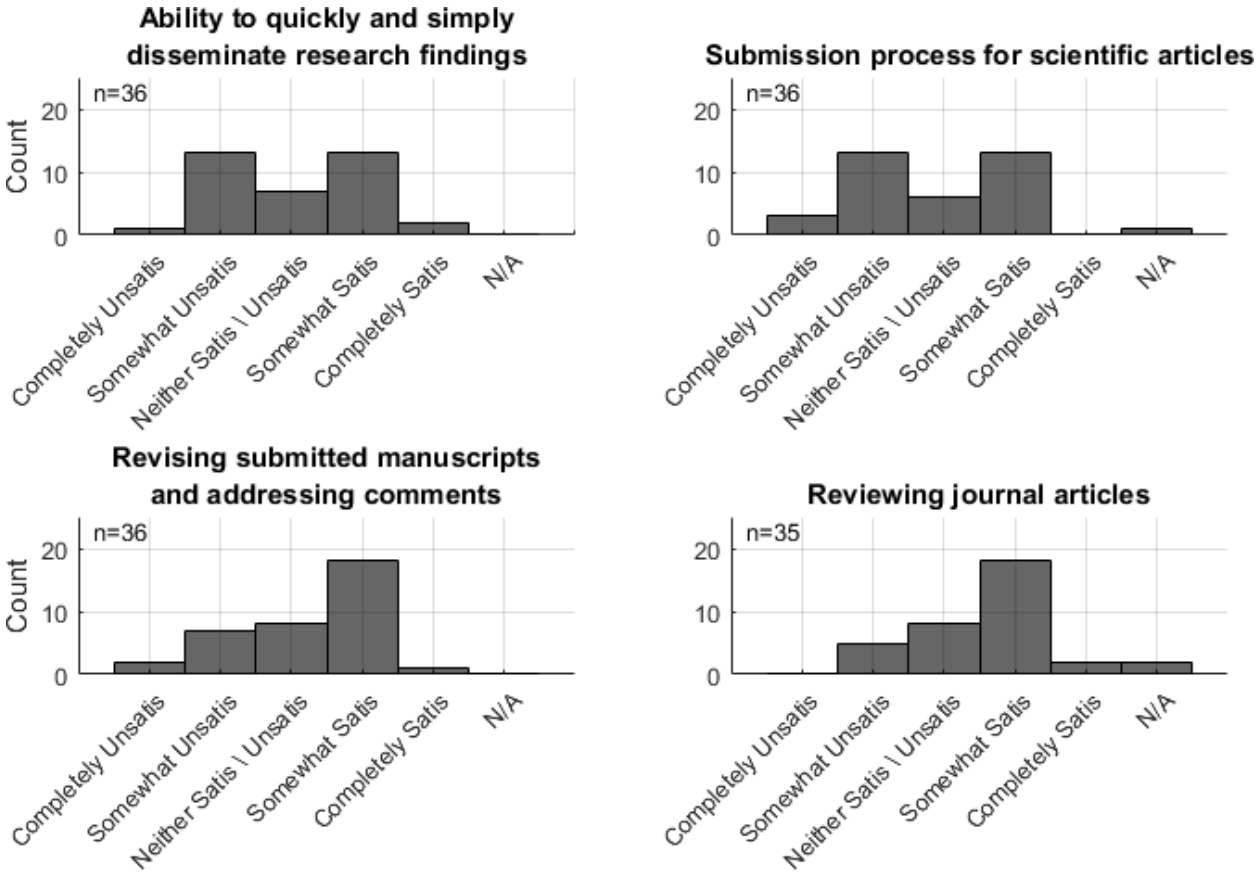

Figure 4: Satisfaction levels of the current publishing model – Write and Review

publishers but perhaps there are a few guidelines that could be adopted worldwide (languages, citation styles, conflict of interest statements).

Acceptance of an Alternative Publishing Model

After a brief description of an alternative publishing model (as described in the introduction), 6 questions were asked about acceptance of a new publishing model. The respondents (Figure 5):

- were split on if they would comment in online articles
- would like to see comments and revisions for articles they read
- would not trust community ranking/review
- were split on if they would causally review articles in this format
- would be willing to peer-review articles for a system similar to the proposed model
- in general, do not submit to pre-print publishing services

This section of TOPS gauged feedback on an alternative publishing that seeks to crowdsource certain aspects of peer review. In a perfect implementation of the community review, various readers could point out imperfections with the article (typos, unclear writing, obvious flaws) that could be addressed prior to peer-review, or raise concerns that peer-reviewers may not have identified.

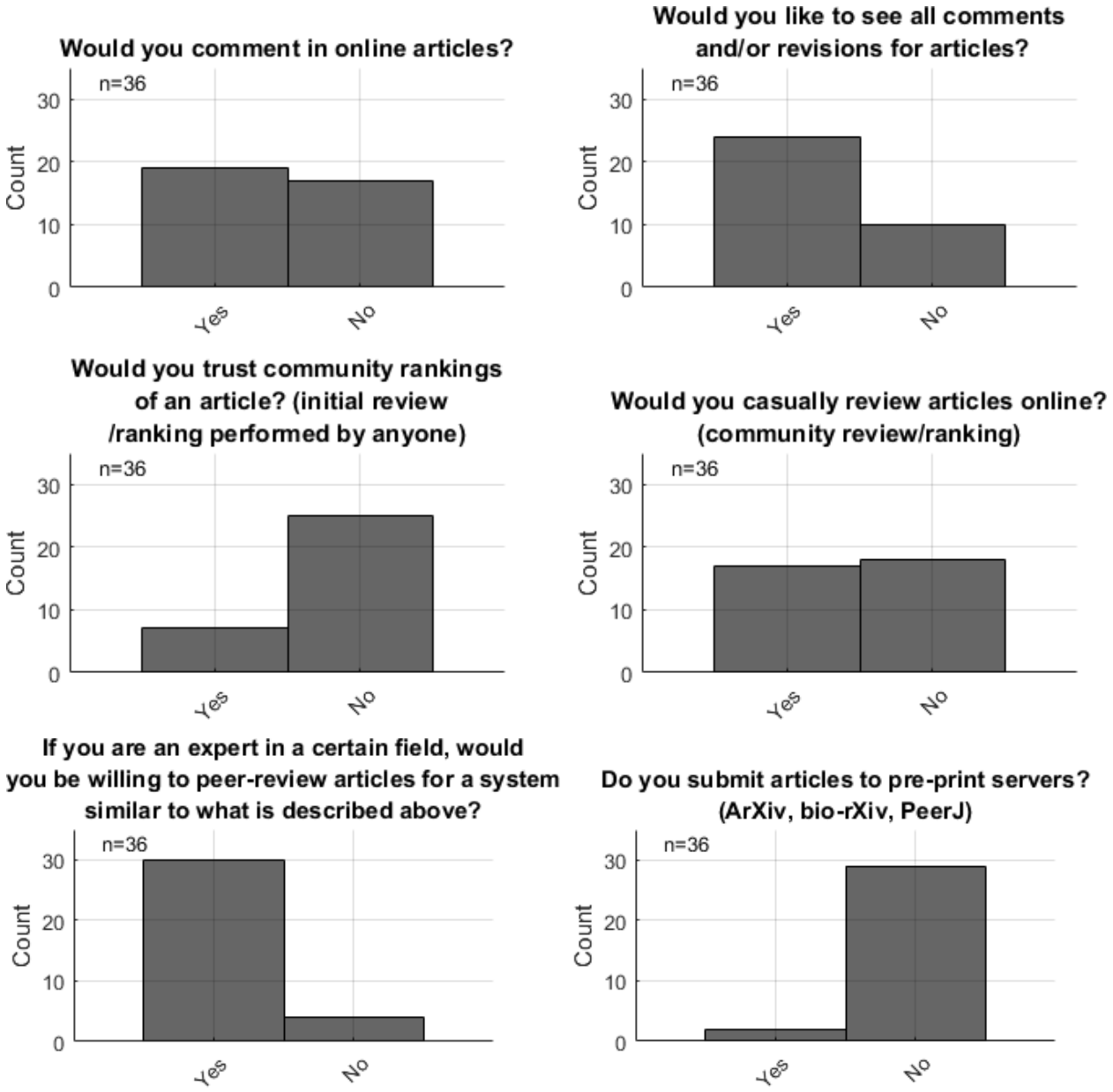

Figure 5: Acceptance of an alternative publishing model.

To implement this practice would be much more difficult. Respondents were mixed in their desire to participate in informal review. Various methods to reduce mob-mentality would need to be implemented. Informal reviewers (and formal reviewers) may need to certify/prove their capability for quality and objective review. Moderators would be paramount to maintaining objective and relevant review and discussion.

Respondents overall said they would not trust community review. In this survey, we defined the community as anyone. Perhaps this would change if the community were a smaller group of interested subscribers who have basic credentials to provide useful feedback and objective review (i.e. specific minimum qualifications such as a college degree and passing an initial reading

comprehension test). We speculate that community review by a known and qualified group would improve the legitimacy of the informal review and scoring.

What aspects of a quality article are most important?

While there are many important characteristics of quality scientific articles, TOPS respondents identified two main aspects (Figure 6):

- application of findings
- sound methods and statistics

This is the backbone of science, where quality and controlled work provides applicable and accurate answers to relevant questions. Scientific publishing should seek to improve access and efficiency while maintaining these two qualities.

Which aspects would you trust the communtiy to judge/review?

For the proposed tiered reviewing to be efficient and effective, informal review should look different than formal peer-review. Respondents identified two main areas that informal review may focus on:

- application of findings
- relevance to society
- novelty *(to a lesser degree)*

Scoring these areas, along with grammar, flow, and clarity could be reasonably reviewed by a larger group or a community. Comments are implemented on some pre-print servers (bioRxiv, PeerJ, PubPeer) and has generated comment/response rates of 10-20%.[10] There are other ideas on how community review could function,[11] but in this article we show that community review and ranking is unlikely to be trusted alone. However, we argue that community review (in some capacity) can still be useful and may help address some issues of the current peer review model, namely improving readability, determining relevance, and initial screening for quality. Formal peer-review could then focus on areas that require expert review and determine whether the article is deserving of prestige.

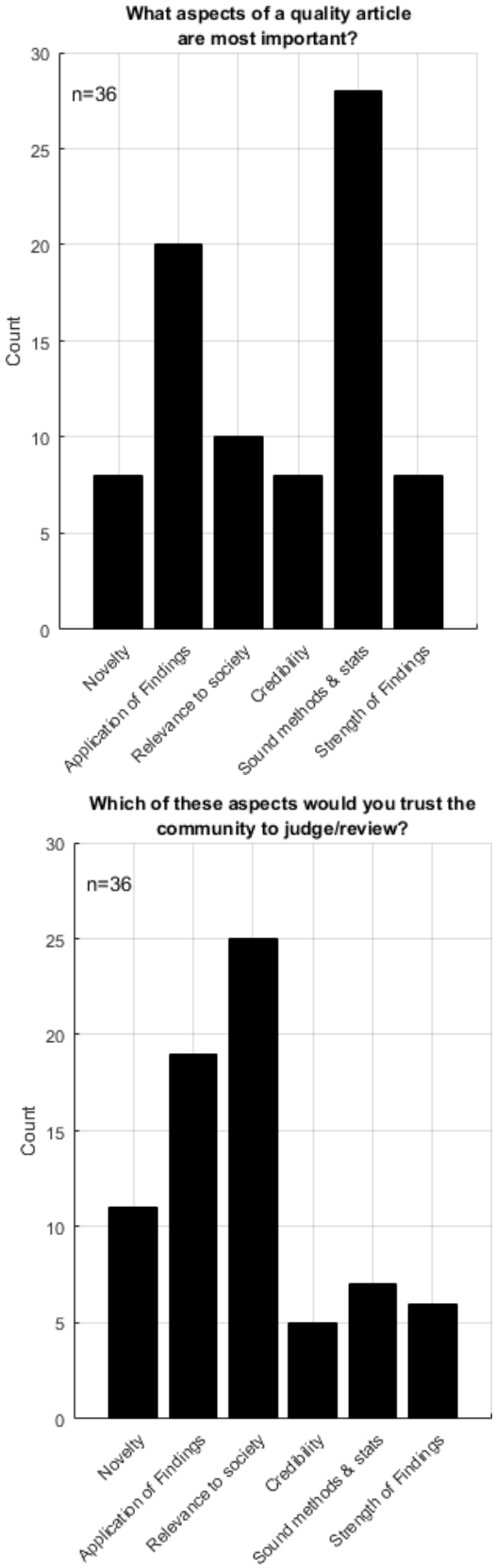

Figure 6: Important characteristics for quality scientific articles.

The proposed model wouldn't necessarily disrupt the current publishing model at large. Pre-prints (or green open access) could be used for initial dissemination and community review. Then, articles that are favored by the community may be passed on to journals for further review, rather than having authors submit to a journal right away.

What would cause you to consider alternative publishing models?

If we are to implement any new publishing model, there will need to be a driving force behind widespread implementation. Participants were asked to rate topics on their likelihood to cause you to consider alternative publishing models (Figure 7):

- The average ranking was within the range of "Neither Likely or Unlikely" to "Somewhat Likely" for all topics
    - Except for "Improvements in reader access to your work", with an average ranking of "Somewhat Likely"
- The median ranking was "Somewhat Likely" for "Increase in prices for submitting/accessing articles", "Improvements in reader access to your work", and "Fair compensation for reviewers."

Improving reader access is the simplest of all the choices to implement because avenues for this already exist. Pre-prints and green open access allow researchers to get their works out to the public

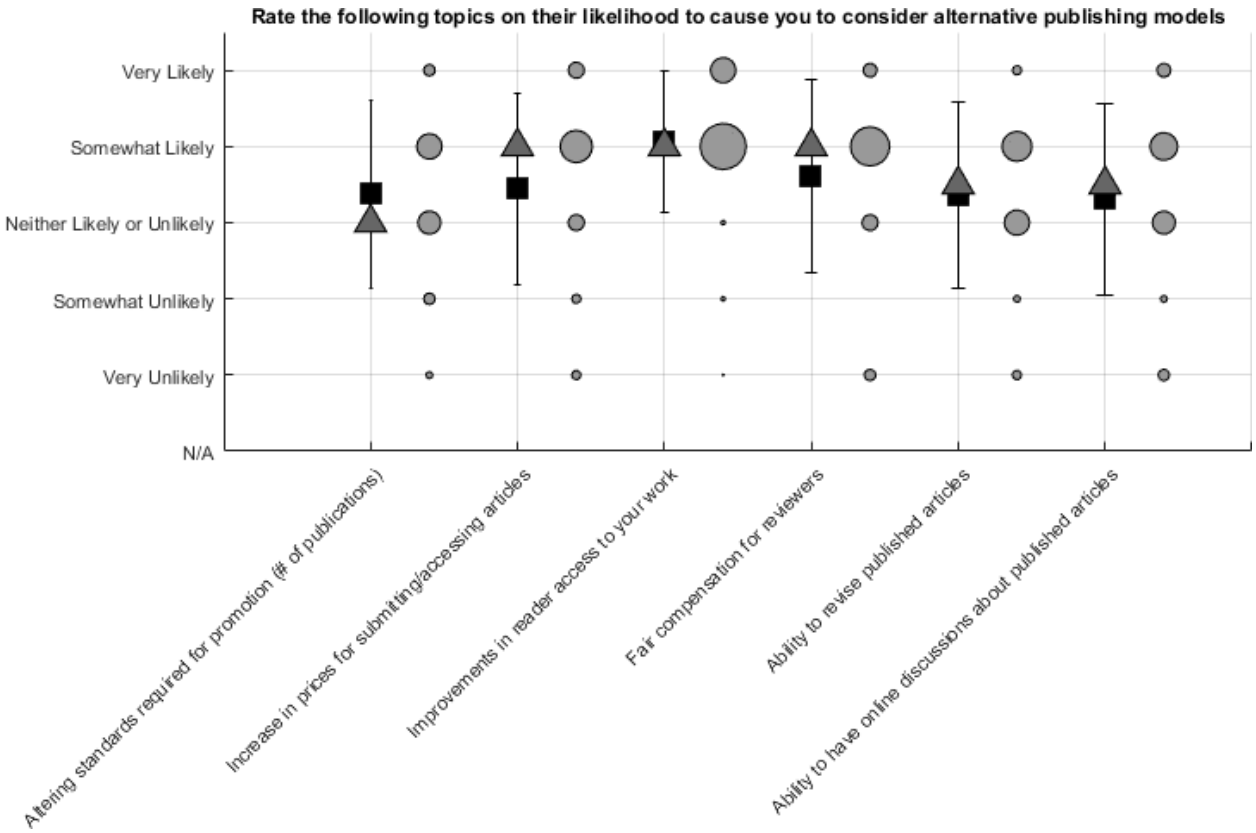

Figure 7: Average (square) standard deviation (square plus lines), median (triangle), and relative rating count (circles) for likeliness to cause one to consider alternative publishing models.

quickly and easily and unconstrained by paywalls.[12] These options have been around for about two decades, they have not been used widely and their adoption also varies by area of study.[10] While pre-prints do address the issue to access to others' work, they do not fix the issue of reviewer fatigue.

Other areas that were somewhat likely to cause respondents to consider alternative publishing models dealt with the economics of publishing and reviewing. Publishing in gold open access can be very expensive for scientists, especially when there is no grant funding available. This is a major concern and limitation of the current open access model. Providing fair compensation for reviewers would be a major way to alter the publishing model, however more research is needed on the economics of peer review, how to improve efficiency, and further reduce costs.

Interestingly, altering standards for promotion (important for tenure-track academic scientists) was not an area of great importance for considering alternative review models. We thought this would be an important topic, but the current set of respondents did not identify that as a strength.

Limitations

This analysis has two major limitations: sample bias and a low overall amount of feedback (only 36 participants completed the survey). While these limitations likely affect the outcomes, this paper is meant to begin/continue the discussion of alternative peer reviewed publishing models. Interested readers may take the survey at: https://is.gd/TOPSurvey.

Conclusion

Scientists want to get their work and research out in the world, however current peer-reviewed options take a long time and can be expensive. Pre-prints (or green open access) are one way to get scientific information out, but do not hold the prestige of peer reviewed articles. Although the proposed dual review system is far from perfect, it combines community and peer review and could improve the overall efficiency of publishing and review. While evaluating publishing and reviewing models, we should ask ourselves: "How can we make the peer-reviewed manuscript fit our workload and budget, and improve its value and reach to foster scientific advancement?"

Acknowledgements

Thank you to the participants for voluntarily completing the survey. Institutional support was received from Children's Hospital Colorado and the University of Colorado Anschutz Medical Campus. Funding for the survey tool (REDCap) was provided by NIH/NCRR Colorado CTSI Grant Number UL1 TR002535). Additional thanks to Patricia Flores for providing feedback on drafts.

Resources

- Survey - https://is.gd/TOPSurvey
- Survey comments and TOPS team responses (as of July 1 2019) - https://goo.gl/PKTEb1
- Resources on open access, reviewer fatigue, and more - http://bit.ly/TOPS_Resources

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