What does better peer review look like? Underlying principles and recommendations for better practice

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Abstract

We conducted a literature review of best practice in peer review. Following this research, we identified five principles for better peer review: Content Integrity, Content Ethics, Fairness, Usefulness, and Timeliness. For each of these principles, we have developed a set of recommendations to improve peer review standards. In this article, we describe the role of peer review and how our five principles support that goal. This article is intended to continue the conversation about improving peer review standards and provide guidance to journal teams looking to improve their standards. It is accompanied by a detailed checklist, which could be used by journal teams to assess their current peer review standards.

INTRODUCTION

Peer review has been, and is still, regarded as the hallmark of scientific and scholarly literature (Blum *et al.*, 2018). In an age of 'fake news' and 'alternative facts', the need to distinguish genuine research has never been greater (Collins & Bassat, 2018). Whether it is climate change denial, anti-vaccination campaigns, or alternative medicine, those making such claims are challenged to substantiate them via peer reviewed research (Dunlap & Jacques, 2013; Tafuri, Martinelli, Prato, &

Germinario, 2011). This places a serious responsibility on the scientific and scholarly literature and the industry that supports it. If peer review is to remain the hallmark of this literature, it must be meaningful. It will no longer be enough for journals to declare themselves 'peer reviewed' (Roberts, 2018); they must become accountable to their readers and transparent about how their review process works. To do this, journals need a common understanding of what good peer review looks like. The scientific and scholarly community needs a set of peer review standards.

The term 'peer review' is currently used as a catch-all to refer to any assessment that a manuscript undergoes, regardless of who undertakes that assessment and when it happens (see Table 1). This understanding is broader than the literal interpretation of the term as the assessment of a piece of research by others working in the same discipline. 'Peer review' is now used to refer to post-publication assessment, whether via a formal solicited review process or an unsolicited letter/comment option, and to pre-submission assessment undertaken informally by colleagues. (For more on this history of peer review see Etkin, Gaston, & Roberts, 2017, chapter 2.) There is a danger that 'peer review' has come to encompass too much and therefore mean very little. It is important for the scientific and scholarly community to bring clarity to this situation by defining what peer review means and what it should achieve. For the purposes of this article, we are primarily referring to peer review as a process instigated and directed by the journal team, rather than informal and unsolicited activities that might happen at other times. Therefore, unless stated otherwise, our recommendations refer to pre-publication peer review. Throughout this article, we will use the term 'journal team' to refer all those directly associated with the journal, including the editor(s), support staff, and the publisher.

The purpose of the scientific and scholarly literature is the communication and curation of a definitive report of conducted research. Peer review serves this purpose by providing a qualitative check of the articles reporting that research. The purpose of peer review is not to ensure truth *per se*, any more than it is the purpose of the scientific and scholarly literature to issue truths by decree. Readers still draw their own conclusions about the value of the research (Nicholas *et al.*, 2015). All scientific conclusions might be modified or falsified by new data, by the refinement of hypotheses, or – sporadically – by shifting of the prevailing paradigm. Authors and reviewers are not expected to be infallible; indeed, corrections, errata, and retractions, although possibly consequences of mistakes in the publishing process, are indicative of the proper functioning of that refinement to the collective body of scientific and scholarly progress. Peer review acts as a check and filter to ensure that the best possible report of conducted research is published. Therefore, when considering the quality of peer review, the focus should be on its effectiveness in this role. What constitutes a good report of conducted research will vary across research disciplines because research methods vary across disciplines; nevertheless, there are principles for peer review that should be universal.

We aim to outline the principles for peer review and to describe what better peer review looks like. For all the criticisms of peer review (see Atjonen, 2018), it seems inevitable, and desirable, that it will remain a core part of the publication process. Inevitable because of the broad support amongst researchers for it to continue (Nicholas *et al.*, 2015) and because of the lack of credible alternative mechanisms to assess the quality of published research (Mulligan, Hall, & Raphael, 2013). That does not mean peer review should not change; many of the criticisms of peer review could be addressed by making it better. It is our hope that this article will challenge journal teams to improve the way peer review is conducted.

METHODS

Through meetings held with Wiley colleagues, and after a review of the literature on peer review, we first identified five principles that we felt define a 'gold standard' of peer review:

- Content Integrity: peer review establishes that the work is reliable and potentially reproducible.
- Content Ethics: peer review establishes that the work was conducted ethically.
- Fairness: peer review is objective and impartial.
- Usefulness: peer review is constructive and helpful.
- Timeliness: peer review provides timely feedback for authors.

TABLE 1　The functions of content review.

What is being checked	Who checks
Ethics compliance	Editorial office
Image manipulation	Editorial office (with tools)
Plagiarism	Editorial office (with tools)
Methodology is sound	Reviewer
Results are plausible and well presented	Reviewer
Interpretation of results is valid	Reviewer
Manuscript is readable and accessible	Reviewer
Data archived and accessible	Editorial office
Spelling, punctuation, grammar	Copyeditor
Formatting	Typesetter

The first two principles relate to the research process, while the last three relate to how peer review is conducted. These principles were then explored in greater detail through solicited case studies. In this article, we present the findings of our literature review, making recommendations about how to implement good practice for each of the five principles. In the course of our research, we identified a number of different aspects to each of the principles and have represented these as sub-headings under each principle. The peer review process involves two sets of actors: external reviewers and the journal team (including editors, assistants, and publishers); our recommendations involve both groups.

This is not the first attempt to articulate best practice recommendations for peer review (see Turner, 2003); we hope to move the conversation forward with timely and up-to-date recommendations. These are intended to complement the guidelines produced by the *Committee on Publications Ethics* and the *International Committee of Medical Journal Editors*. Our recommendations cannot hope to be exhaustive. We believe the recommendations we are making will help clarify and improve peer review. They are intended to hold across disciplines, including the Humanities, although some recommendations will have specific application in certain disciplines (e.g. handling data).

We have not isolated transparency as a principle in its own right – although it is pertinent to many of recommendations – because transparency is not an unqualified good. Some aspects of the peer review process require confidentiality and discretion. Mishandled transparency can be misleading and/or unhelpful. We recommend transparency when it is the means to achieving other recommendations.

CONTENT INTEGRITY

Peer review addresses the integrity of the work under review when it focuses on ensuring that researchers publish an accurate, verifiable, and complete representation of how they did their work and the outcome. This will mean that reviews and decisions are founded on the quality of science or scholarship to ensure that the published article is as accurate, complete, and as potentially reproducible as possible.

Historically, peer review, like journal publishing in general, has been shaped by both constraints and interests. One key constraint for journals has been that of the page budget and how much a journal can practically publish. Such a constraint inevitably requires the filtering of submissions by priority rather than just merit. There are other constraints as well. Journals often measure success by metrics such as subscriptions, downloads, and citations. Again, these interests incentivize assessing an article for citability and newsworthiness, alongside consideration of merit. Journals cannot ignore these pressures, but they can adopt peer review standards which ensure that quality is not compromised by them.

I1 – Content quality

- Reviews and decisions should focus on the quality of the methodology, completeness of data, and interpretation of results rather than (and perhaps instead of) positive or negative results alone.

Many of the incentives for journals and for authors are focused on articles that are impactful, as measured by, for example, citations, downloads, or newsworthiness. Whilst it is not inappropriate for authors or editors to want research to make an impact, these incentives are not necessarily perfectly aligned with the best interests of the scientific and scholarly literature. Research with negative results may not be widely publicized but needs to be published to avoid wasted efforts of future researchers. Replication studies may not be widely read, but reproducibility is an essential aspect of the scientific method. There can sometimes be a sharp disjunction between what the public finds interesting and what is in the public's interest. Ultimately, the primary incentive for the scientific and scholarly literature, and thus for peer review, should be the pursuit of knowledge. Therefore, peer review should focus on whether the methodology is sound and whether the interpretation of the results is valid, rather than the predicted impact of the article.

This does not mean eliminating any editorial consideration of novelty or priority. Even if incentives for researchers were more closely aligned to merit rather than impact, truly ground-breaking research would (and should) still get more attention than replications and derivative studies. Some research should be brought to the attention of the general public, some research should inspire new studies (and thus be highly cited), and some research should be read widely (and thus be highly downloaded). Whilst journal brands remain the aggregators of readership, it is inevitable that research will be filtered by novelty and priority. Integrity and quality should always come first.

- Journal teams should ensure the journal's standards for the acceptance of articles are transparent to both authors and reviewers.

Transparency is important to authors because it manages their expectations about how their submissions are assessed. Transparency is important to reviewers because it informs their approach to assessing the manuscript they have been invited to comment on. Transparency is important to readers and the research community in general because it allows them to assess what confidence they should have in what they are reading. A review process that is focused on quality, and is seen to be such, will receive the confidence of the research community.

I2 – Content accuracy

- Reviewers should carefully read through manuscripts and write thorough, well thought-out reviews to ensure rigorous assessment of the accuracy of the content.

Unfortunately, there are still too many examples of manuscripts receiving cursory reviews (Rodriguez-Bravo *et al.*, 2017). Reviewers need to be held accountable for such bad practices, primarily by the handling editor. This may mean providing feedback to reviewers who provide unhelpful reviews. There is currently no consensus about how to assess the quality of reviewer reports (Sizo, Lino, & Rocha, 2018; van Rooyen, Black, & Godlee, 1999); the onus is on editors to confirm whether the review meets the journal's requirements. Peer review is a core academic activity and should be recognized as such by reviewers and by their institutions (Davidoff, 2004; Ferris & Brumback, 2010).

- Editors should be able and ready to provide advice to reviewers.

To provide thorough reviews, reviewers need guidance. This may be in the form of standard guidelines to reviewers or requests specific to the manuscript under review. This will be particularly important for early career researchers who are often unfamiliar with the review process (Merry, Jarvis, Kupoluyi, & Jomama Lual, 2017). Editors should also be available to provide advice to reviewers if questions arise during the review process. Ultimately, it is the editor who has overall responsibility for the manuscripts they are assigned to, and so, the editor needs to take ownership of the review process. Evidence shows that an active editor makes a crucial difference in ensuring the effectiveness of peer review (Esarey, 2017).

- Journal teams should make provisions to carefully review concerns raised by readers after publication and act where warranted to ensure that what is published is accurate.

Maintaining the version of record is a primary responsibility of every journal, and part of that responsibility is issuing corrections, or even retractions, to ensure the accuracy of the version of record (Peterson, 2018). Each journal should have a way for readers to contact the editorial office if a concern arises, and each journal should have a policy for how such concerns are handled.

I3 – Content completeness

- Journal teams and reviewers should check that the report of the research is as complete as possible, especially the description of the methodology and the results. Journal teams should encourage the use of relevant reporting guidelines to ensure consistency across journals.

The way research is reported is integral to ensuring that it can be both properly understood by readers and used as a foundation for future research. The so-called 'reproducibility crisis' (Pashler & Harris, 2012) has drawn attention to the concern that the description of the methods reported in many scientific articles is insufficient to allow for replication of the research and thus fails one of the basic tenets of the scientific method. Reporting guidelines have been developed in many disciplines to address this problem, providing a way for authors to check that their articles are as complete as possible and in accordance with the best practice for their discipline. However, adherence to these guidelines remains stubbornly low (Page *et al.*, 2017). Journal teams should encourage reviewers to use reporting guidelines, so they can assess the completeness of the article (Hirst & Altman, 2012). Furthermore, to address the fact that most scientific publications still fail to report on potential sex and gender differences and similarities in studies that include both sexes, there are now sex and gender reporting guidelines that should be adopted, where relevant (Heidari, Babor, de Castro, Tort, & Curno, 2016).

Another element of completeness is the transparency of the research process, from the pre-registration of the initial research protocol (if applicable) through to the accessibility of the research data. Occurrence of pre-registration is still stubbornly low (Chan, Pello, Kitchen, *et al.*, 2017). Ensuring that relevant reporting and transparency guidelines are followed should be part of the review process. Studies have shown that adherence can be improved by the rigorous implementation of policies by the editorial office (Macleod, 2017). Other elements of completeness include transparency around conflicts of interests and funding. Here too, current practice is uneven and inconsistent (Grundy, Dunn, Bourgeois, Coiera, & Bero, 2018).

Reviewers should check the completeness of the literature review within the article. However, reviewers should not seek to use this as an opportunity to acquire citations to their own work, if tangential. Journal teams should not seek to 'game' citation metrics by recommending unnecessary citations to articles previously published in the journal.

- Journal teams should encourage authors to share and cite data in a separate repository (if not part of the journal article).

Data-sharing policies vary between journals, between publishers, and between disciplines. There are also a variety of data-sharing initiatives available, whether it be institutional repositories or cross-discipline repositories. Publishers also offer facilities for authors to make supplementary material available to readers.

The preparation of data for deposit in a repository is not an insignificant task. Some research data may be confidential, and data containing personal identifying information cannot be disseminated. There are other reasons why it might not be deemed appropriate to share data. Therefore, we are not recommending absolute and unrestricted access to all data as such a recommendation would be impractical and possibly undesirable. Journal teams need to adopt data-sharing policies that are appropriate and responsible and which ensure that the reader has sufficient information to understand the article. Where possible, the option for future research teams to have access to the data for either replication studies or meta-analyses is to be encouraged. Where

authors cannot make data accessible, the journal team should require an explanation.

It is not currently the norm to peer review the empirical data reported in an article, although some journals have adopted data review policies. This might involve checking the quality of the data to see if it aligns with the conclusions of the paper or re-running the analyses to see if the results can be replicated from the data provided.

CONTENT ETHICS

Peer review addresses the ethics of the work under review when it establishes that the work was conducted responsibly. Journals use peer review to check that the work they consider publishing was conducted in a way that treated participants (people, animals), the environment, and colleagues responsibly, in a way that minimizes harm and meets community expectations (self-regulation) and regulatory requirements. Peer review may help journals to avoid publishing unethical work.

E1 – Research ethics

- The journal's author guidelines should state the relevant ethical standards and include links to relevant guidelines and legislation. Journal teams should ask authors for confirmation that they have complied with these standards and check that manuscripts contain an explicit statement confirming that the research was approved by the relevant bodies (which should be named in the manuscript) or an explanation of why the study was exempted from such approval.

Journals cannot police ethical research practices, but they can play their part, in concert with other bodies, to encourage ethical behaviours. This may include holding authors to a higher standard than their local ethics bodies. For example, a journal may adopt a high standard on animal welfare and may refuse to consider articles about research that did not follow those standards. Journals have no power to grant and refuse ethics approval but can check retrospectively whether approval was given. Similarly, journal teams can check that consent was acquired from each participant for their involvement in the study and for any personal information included in the article.

- Journal teams should check for symptoms that might suggest research misconduct, for example, image manipulation or data fabrication. If misconduct is suspected, they should endeavour to ensure that this is properly investigated by the author's (or authors') institution(s).

Research misconduct is bad for the scientific and scholarly literature as it may lead to erroneous or even fabricated results being given the credibility of publication. The impact of such fabrication can be significant, particularly for research directly applicable to health and social practices (Godlee, Smith, & Marcovitch,

2011; Le Noury *et al.*, 2015). The authors have primary responsibility for ensuring that their research is conducted ethically and leave themselves open to legal action if they knowingly commit fraud. Whilst the peer review process cannot hope to pick up on all misconduct, journals have a responsibility to take reasonable steps to ensure research misconduct is detected and offending manuscripts refused publication.

Journal teams should have appropriate policies for dealing with concerns raised after publication.

E2 – Publication ethics

- Journal teams should ask authors to declare that the submitted work has not been previously published, is not being considered for publication elsewhere, and that they have the rights to the work they are submitting.

Whilst there are significant incentives for authors to have their work published, re-publishing the same work in multiple venues or 'salami-slicing' their research is detrimental to the scientific and scholarly literature. At best, it wastes time and effort. At worst, it over-inflates the significance of their research and skews the results of meta-analyses. To prevent this, authors should be discouraged from parallel submissions and redundant publication. Furthermore, journal teams should ensure copyright is respected by checking that authors have the rights and permissions to publish their submitted content.

Many journals do not consider pre-prints, working papers, or conference presentations to constitute prior publication. Journal teams should ensure their author guidelines are clear about what is and is not considered prior publication.

- Journal teams should utilize software to check for textual overlaps with other published works. Journal teams should investigate any discovered overlap for evidence of plagiarism or redundant publication.

Even if articles were not protected by copyright, plagiarism would still be wrong. Taking credit for the work of another is unfair and has negative outcomes for research. Journal teams have a responsibility to try to prevent plagiarism. There are now software tools available that allow for the easy identification of textual overlaps. Not all textual overlap is unjustified. Plagiarism of results can be harder to detect if there is no textual overlap, although this can be identified by reviewers.

- Journal teams should ensure that a conflict of interests statement for all authors is included in the manuscript.

All authors have interests that might impact their objectivity. These interests might be financial, social, or ideological. It would not be possible for an author to eliminate all such conflicts of interest, nor would it be desirable for the literature for authors to be censored due to such conflicts. Instead, the impact of such

conflicts of interest should be mitigated by a clear and transparent statement, which is made available to both journal teams and to readers.

FAIRNESS

Peer review is conducted fairly when it considers papers on their own merit, without regard for the identity of the author(s) or the reviewers' and editors' own interests. Fairness complements Integrity because a peer review process which ensures that the published article is as accurate, complete, and as potentially reproducible as possible is incompatible with a process that is biased by the identity of the author(s) and/or the interests of the reviewers or editors. Fairness is also a rooted in a straightforward moral axiom ('treat others as you would like to be treated'). Authors have a right to expect their work to be assessed fairly; journals have a responsibility to meet that expectation. Similarly, authors have a responsibility to be fair by ensuring recognition is granted according to merit. Therefore, both for the benefit of the scientific and scholarly literature and because it is the right thing to do, we advocate that all journals take steps appropriate to their disciplines to ensure that submissions are assessed fairly.

A tendency to associate and collaborate with people who are similar to oneself may manifest as bias, for example, in gender, ethnicity, and socioeconomic status (Walker, Barros, Conejo, *et al.*, 2015). A tendency towards group-think may limit genuinely novel proposals (Grayson, 2002) or bias reviews in favour of those from the same 'school of thought' (Teplitskiy, Acuna, Elamrani-Raoult, Körding, & Evans, 2018). The incentives for competition and personal advancement can motivate unethical reviewer behaviour, such as trying to scoop research results or direction or by giving adverse reviews. There is no separating peer review from community social dynamics, nor should we want to entirely, but we can strive towards mitigating the negative impacts.

F1 – Authorship attribution

- Journal teams should clearly state their policy regarding authorship attribution, setting out which contributions do and do not qualify for authorship. Authors should be asked to declare that all listed authors meet the journal's criteria for authorship and no qualifying authors have been omitted
- Articles should include a description of each individual's contribution to the work.
- All authors should be copied, via legitimate email addresses, into emails confirming receipt of submission and the outcome of the peer review process. Journal teams should follow up on undeliverable emails to ensure this communication is received.

The pressure to publish, and the benefits that accrue from publication, provides strong incentives for researchers to claim authorship unfairly, beyond their contribution to the research. Standards of authorship vary across disciplines. For instance, some disciplines have a tradition of listing a doctoral supervisor as a co-author, whereas other disciplines do not. In some disciplines, the order in which authors are listed denotes significance of contribution. There are also regional variations in how authorship is recognized. Some institutions only give recognition to researchers listed as corresponding author; papers with multiple corresponding authors are symptomatic of this pressure. Such methods of attribution are opaque and arcane.

Therefore, we recommend that journals be transparent about their policy of authorship attribution. The criteria of authorship advocated by the *International Committee of Medical Journal Editors* have been widely adopted (see www.icmje.org/recommendations/browse/roles-and-responsibilities/defining-the-role-of-authors-and-contributors.html), although there have been recent calls for reform (Helgesson & Eriksson, 2018). Those who do not qualify as authors but have contributed to the article should be recognized in an Acknowledgments statement. Yet authorship itself as a concept is not specific and flexible enough to give full recognition to the various contributions made by authors and collaborators in undertaking research and preparing it for publication. A detailed contribution statement within the article gives proper recognition to these various roles. The CRediT taxonomy developed by CASRAI is a way of formalizing such contribution statements, ensuring consistency across journals and disciplines (see https://casrai.org/credit/).

It is not, ultimately, the role of journals to police authorship – this is not possible – but due diligence can be undertaken by following the recommendations above.

F2 – Revised papers

- Reviewers should write thorough reviews in the first round of peer review. They should not introduce new comments without good reason in future rounds of revision.
- Editors should limit rounds of revision to what is necessary and not invite new reviewers to revised papers unless justified by circumstances.

Authors have a reasonable expectation that addressing requests for changes will lead ultimately to publication. There may be cases where authors do not make sufficient changes to meet the request or indeed where they are not able to meet the requests (such as where new data is requested), but all other things being equal, authors should not be asked to devote time to making changes unnecessarily. Therefore, reviewers have a responsibility to try to ensure that major requests for changes are made in the first round of review and that subsequent rounds are primarily directed at assessing whether those requests have been met. Inevitably, there may be cases where something is missed in the first round of review, and the integrity of the published article cannot be sacrificed to the ease of the authors. Editors have a responsibility to limit the number of rounds of review by directing reviewers in the way they approach the different stages of review. It will generally not be appropriate to assign new reviewers to a revised manuscript as new reviewers will not be

best placed to check whether the requested changes have been made. If reviewers do make new requests in subsequent rounds of review, the editor needs to decide whether it is necessary to communicate these to the author.

F3 – Conflicts of interest

- Editors should be asked to declare any conflicts of interest that might affect their judgement and be directed not to use information gained in peer review to their own advantage.
- Editors should consider the need for impartiality in peer review when inviting reviewers and avoid inviting close colleagues or recent collaborators of the author.
- Potential reviewers should be asked to contact the editorial office for advice before accepting an invitation to review if they recognize they have a perceived or actual conflict of interest that may hinder them from considering the manuscript objectively. Reviewers should be directed not to use information gained in peer review to their own advantage.

There are numerous interests that might bias the assessment by both editors and reviewers, positively or negatively. These include financial interests, personal relationships, academic interests, or even ideological differences. It is important that such conflicts of interests are addressed and are seen to be addressed.

By declaring conflicts of interests, editors allow authors and readers to scrutinize any issues that may have affected their judgement. The existence of a conflict of interests does not, of itself, entail that the editor should recuse himself/herself from handling the submission. Sometimes, disclosure will be sufficient. Either way, editors should be transparent about such conflicts, through a publicly available conflict of interests statement and a published statement within articles where they recused themselves.

Editors have a responsibility to consider conflicts of interests when inviting reviewers. Close colleagues or recent collaborators of the author should not be invited to review. Editors can also mitigate potential reviewer biases by inviting reviewers from a wide and diverse pool of reviewers.

Asking potential reviewers to disclose conflicts of interests allows the editor to make a judgement about whether to proceed with the review and to assess whether the review is partial once the comments have been supplied. One argument made for disclosing reviewer identities to authors and/or readers is to allow for transparency around potential conflicts of interests. Under such a process, making available a conflict of interests statement from the reviewers might be appropriate.

All those involved in the review process, including editors and reviewers, should review disinterestedly and without thought for personal gain.

F4 – Confidentiality

- Journal teams should make it clear to reviewers that manuscripts under review are confidential, and the information should not be shared with anyone (including colleagues) without first contacting the editorial office. This may vary depending on peer review models but usually applies until at least the time when the manuscript is published. Review forms might include a specific question asking the reviewers to confirm that they have read and understood these guidelines. Breaches of confidentiality should be investigated appropriately.
- Before asking another person to assist with a review, reviewers should contact the editorial office for permission to share the paper with them, and they should then acknowledge the assistance on the review form.

Authors are entitled to expect that their manuscript and accompanying information will only be used for the purposes for which it was supplied, that is, for peer review pending possible publication. It would therefore be inappropriate for anyone involved in the review process to share the manuscript with anyone not involved in the review process. Where manuscripts include personal data, it may be illegal to do so.

There are reasons why authors may wish to keep their research private until publication. Their data might be sensitive or confidential, their results might be subject to embargo or patents pending, or they may wish to keep their results private from competing research groups. Furthermore, journals cannot hope to control for conflicts of interests if they do not know with whom manuscripts are being shared.

The publishing landscape is changing. Increasingly, researchers are using pre-print servers or institutional repositories to share unpublished and unreviewed research. There have also been experiments in public, or unsolicited, peer review, although they have had uninspiring results (Nature, 2006). It is possible that concerns which motivate the present confidentiality might be addressed by version tracking solutions, such as Blockchain (Avital, 2018) or F1000. Regardless, journals need to be transparent about what they will do with manuscripts submitted for review to give authors confidence about what they can expect from the review process.

F5 – Bias

- Journal teams should explore how to reduce bias caused by common prejudices in peer review, which may include encouraging authors to consider diversity when suggesting reviewers, operating a double-blind peer review process or an open (signed and published) or transparent (unsigned but published) peer review process, or training editors to be aware of the effects of implicit bias.
- Where possible, journal teams should start reporting on the demographics of their authors and reviewers to ensure inclusion and diversity.
- Publishers have a responsibility to ensure that editors and editorial boards are diverse and represent the community they serve.

Peer review assesses manuscripts, not authors. Manuscripts should be reviewed on merit alone. Issues pertaining to the person of the author(s), such as gender, ethnicity, age, or prestige, should be strictly irrelevant. Yet there is evidence from various fields of human activity, including grant review (Tamblyn, Girard, Qian, & Hanley, 2018), that we are subject to conscious and unconscious biases (Fay, 1993; Steinpreis, Anders, & Ritzke, 1999). The evidence on bias in peer review is mixed, with some studies concluding that bias occurs (Link, 1998; Tomkins, Zhang, & Heavlin, 2017; Tushingham, Fulkerson, & Hill, 2017), and other studies finding no significant impact (Lee, 2012), for example, Burns and Fox (2017) concluded that socioeconomics and language are more important factors than editor or reviewer bias in explaining geographic variation in acceptance rates (Burns & Fox, 2017; and see also Engqvist & Frommen, 2008). Author-suggested reviewers have been found to be more favourable than editor-selected reviewers (Bornmann & Daniel, 2010; Fox, Burns, Muncy, Meyer, & Thompson, 2017). It can be argued that the more peer review is an objective exercise, the less opportunity there will be for bias to operate. The reported p-value is either statistically significant or is not; the gender of the author cannot change that. Nevertheless, the concern of authors about bias is very real, especially when the incentives are present for partiality in review (D'Andrea & O'Dwyer, 2017).

Intuitively, one would conclude that anonymizing manuscripts (i.e. double-blind peer review) were the best way to safeguard the review process from such biases. Reviewers frequently express a preference for double-blind peer review (Curtin, Russial, & Tefertiller, 2017). When given the option in pilot studies, authors from 'top' institutions tended to opt for single blind, whereas those from less prestigious institutions opted for double (Rodgers, 2017). Objections that anonymity cannot be preserved are not supported by evidence (Le Goues *et al.*, 2018). Space does not permit for a full literature review on double-blind peer review; suffice to say that the evidence is mixed, with some studies finding that double-blind peer review reduces bias, whilst other studies found no effect. We are therefore unable to make an evidence-based recommendation in favour of double-blind peer review, despite its intuitive appeal.

It might be argued that open and/or transparent peer review provides an alternative mechanism for reducing reviewer bias (Ross-Hellauer, 2017). If reviewers are made accountable for their recommendations that might reduce conscious attempts to influence outcomes unjustifiably. It may even have an impact on unconscious biases. To date, the evidence does not exist to substantiate these intuitions, and so, again, we are unable to make an evidenced-based recommendation in favour of open peer review. We welcome ongoing research into peer review models.

The way reviewers are selected also risks introducing bias into the process. Fox *et al.* (2017) found that author-suggested reviewers are more likely to be male in general, and male authors are even more likely to suggest male reviewers. Editors also have been found to demonstrate homophily when selecting reviewers, both with regards to region (Gaston & Smart, 2018) and gender (Helmer, Schottdorf, Neef, & Battaglia, 2017). Switching to a more objective reviewer selection strategy, based on a taxonomy of expertise and on merit, is likely to decrease bias in review outcomes.

There are other strategies for mitigating the effects of reviewer bias. Consulting more than one reviewer reduces the potential for subjectivity. Diversifying the reviewer pool may reduce review bias (Teplitskiy *et al.*, 2018). The mediating role of the editor should also help pick up on unsuitable reviewer recommendations (Bastian, 2017). Editors should be supplied with information about unconscious bias. There is evidence that author-recommended reviewers are more likely to give favourable reviews, and so, editors should be cautious about over-reliance on such recommendations (Liang, 2018). Regularly reporting on the demographics of authors and reviewers will raise awareness about diversity and inclusion.

USEFULNESS

Peer review is useful when it benefits all stakeholders in the process. It means providing constructive feedback to authors so that they can improve the clarity and accuracy of their research article and report their work in the best possible way. It means providing reviewers with concise and easily accessible guidance on assessing papers. It means a final article that makes an important addition to the literature.

In survey responses, researchers often indicate that peer review is beneficial to improving their article and that peer review contributes significantly to the effectiveness of scholarly communication (Rowley & Sbaffi, 2017). There is also evidence that good peer review strengthens the community, whilst bad peer review weakens the community (Dali & Jaeger, 2018). Many initiatives aim to improve the usefulness of peer review for all parties involved (e.g. see the discussion on the Scholarly Kitchen blog, Michael, 2015). Considering and adopting continuous quality improvement methodologies seems intuitively a sensible path for journals to follow (e.g. see the 2015 interview with Dan Filby, CEO, HighWire Press on the Beyond the Bool blogsite) (Beyond the Book, 2015).

U1 – Guidance

- User-friendly author guidelines should be easily accessible so that submitted manuscripts are in the best possible format to reap the full benefits of the peer review process.

One common complaint from authors is that the submission process is too complicated, with too many requirements and with frustrating systems (Hartley & Cabanac, 2017). This is not symptomatic of a useful process. Whilst submission requirements cannot be eliminated altogether as they will be necessary to ensure proper peer review, submission requirements and submission systems should be accessible.

U2 – Constructive

- Peer review should help authors to express and communicate their work, not simply criticize their output.

Rejection is not a dirty word. Some papers need to be rejected because they are unsound, because they are not within the scope of the journal, because they are fraudulent, or because they breach ethical norms. However, whilst a meaningful review process will always necessitate some rejections, for most papers, the peer review process should be constructive. This means a process that provides authors with feedback to help them improve their paper. Even authors whose work is rejected should receive useful feedback that helps them determine their next steps (e.g. is it worth submitting elsewhere?)

- Journal teams should recognize reviewer efforts, for example, by providing reviewers with a copy of the decision letter or perhaps by awarding professional development or continuing education credits for peer review or through other recognition schemes.

Reviewers are integral to the peer review process. For most journals, their contribution is voluntary and unpaid. Studies consistently find that reviewers are primarily motivated by a sense of responsibility to the discipline and by interest in upcoming research (Curtin *et al.*, 2017; Warne, 2016). Researchers as reviewers reciprocate for the benefit they receive as authors (Tuckett & Kangasniemi, 2017). Other forms of recognition not only provide additional motivation to reviewers, they are also useful to reviewers in their personal and career development. Journal teams should continue to explore new ways to give reviewers appropriate recognition (Messias, Lira, Furtado, de Paula, & Rocha, 2017).

- Journal teams should share a copy of the decision letter and other reviews (anonymized as required) with all reviewers.

One way of helping reviewers improve their reviewing is to share with them the outcome of the process, including the comments of editors and reviewers.

U3 – Transparent procedures

- General ethical guidance and journal-specific reviewer guidelines should be published and made easily accessible to all parties so that more relevant feedback can be collected to aid authors in improving their work and to aid editorial decision making.
- Where possible, reviewer scoresheets, editorial office checklists and other content assessment rubrics should be made available to authors, reviewers, editors, and readers.

Transparency can add to the usefulness of peer review (Wicherts, 2016). The more authors see beforehand about the

requirements, policies, and procedures of the journal, the better they can prepare their manuscript for submission. The more reviewers see about the guidance given to authors and the standards applied by editors, the better they can tailor their efforts to aid the editors. The more readers see about the peer review process, the better understanding they will have of the final article.

There are increasing calls for journals to publish review reports, arguing that it improves accountability and the understanding of the final article without impacting review quality – see, for example, the open letter on the ASAP Blog, http:// asapbio.org/letter. We anticipate this trend will continue. We welcome ongoing research in this area.

U4 – Continuous improvement

- Journal teams should conduct regular audits, through surveys or focus groups, of authors', reviewers', and editors' needs and perceptions of the journal's peer review process to increase the usefulness of the process.

Usefulness is a relative concept – relative to the changing needs and wishes of the stakeholders in the process. Journals teams need to continually monitor those needs and wishes and respond accordingly by updating their policies and procedures.

TIMELINESS

Peer review is conducted in a timely manner when an outcome is reached quickly, without compromising the focus on integrity and ethics or the usefulness and fairness of the review process. Timely publication means research results are published when they are most relevant for further research.

Slow peer review can be unfair to authors as they cannot seek publication elsewhere whilst their manuscript is under review and are deprived of timely recognition for their work. For peer review to be useful for both authors and readers, it must be completed within a reasonable timeframe. Slowness is one of the main criticisms of peer review (Nguyen *et al.*, 2015; Powell, 2016). Unpublished market research undertaken by Wiley has found that authors in most disciplines expect peer review to take under 30 days, while a peer review time in excess of 37 days is considered too long. The research found discipline differences, with Health Sciences researchers expecting review to be completed within 18 days, Life and Physical Sciences within 26 days, and Social Sciences within 29 days. Reviewers often complain, however, that undertaking reviews is time-consuming and that they are not given enough time to provide a quality assessment (Publishing Research Consortium [PRC], 2016; Rodriguez-Bravo *et al.*, 2017), and other research indicates that reviewers often spend more than 6 h per review (Mulligan *et al.*, 2013; PRC, 2016). Here then is the timeliness paradox: researchers as authors want decisions as soon as possible, but researchers as reviewers want more time to provide better reviews. There may

be no way to truly square this circle, but journals should take steps to ensure that review is conducted in a timely manner.

We have not made specific recommendations about suitable timeframes. In part, this is because what is considered an appropriate length of time will vary between disciplines and between journals. It takes longer to review a 10,000-word review article than a 2,000-word case report. A process that includes image checks, statistical checks, *etc.* (e.g. for a life science journal) will take longer than a process that includes none of these things (e.g. for a history journal). In any case, selecting a specific number of days to complete the process would be arbitrary. It is the efficiency of the process that matters, not length of time *per se*.

T1 – Shared responsibility for timeliness

- Timeliness should be a shared objective for everyone working in an editorial team.

The editorial office alone cannot ensure that manuscripts are reviewed in a timely manner. All participants in the process must take a share of the responsibility. Researchers should recognize that their desire for a swift review process when they submit as an author should be reciprocated by a respective motivation to return their comments promptly when they are asked to review. It is good practice to encourage declining reviewers to suggest potential reviewers to help editors find reviewers with appropriate expertise.

Journal teams have a responsibility to treat reviewers with courtesy and respect. With the pressures to find reviewers, some journals have adopted a 'scattergun' approach of inviting multiple reviewers at once and automatically 'uninviting' any outstanding reviewers once two reviews have been received. This approach should be discouraged. Reviewer invitations should only be issued with the genuine intention of soliciting the reviewer's opinion. Once they have agreed, reviewers should be allowed the full deadline to complete their review and should not normally be dismissed unless severely overdue.

In most cases, reviewers are unpaid and supply reviews on a voluntary basis. Intuitively, one might suppose that providing additional incentives for review would improve reviewer performance and thus improve timeliness. However, research indicates that performance-related rewards actually disincentivize reviewers (Zaharie & Seeber, 2018). We encourage appropriate reviewer recognition (see U2). But we cannot make evidence-based recommendations about using incentives to improve timeliness.

T2 – Transparency

- Expected timeframes for the end-to-end peer review workflow should be published, usually expressed as a median from the prior calendar year.

Authors should be given reasonable expectations about when they will receive a decision. This should include a breakdown of the separate stages of the process, as relevant, so authors can appreciate the time required.

Expected timeframes are different from guarantees. Even if journals were to offer guarantees, they would have to allow for exceptions, such as when an ethics investigation is required. Therefore, it is better to talk in terms of expectations.

- Journal teams' expectations of editor and reviewer commitments should be clearly communicated to them.

Before an editor is appointed to a journal, they should be given a clear set of expectations of the standards the journal works to, including turnaround times.

It is both courteous and expedient that invited reviewers should be informed of the deadline for a review and given the option to decline if they cannot complete the review in the given timeframe.

- Authors should be kept informed about the status of their manuscript, including an explanation for any delays.

Managing expectations is not simply a matter of describing the expected timeframes. It also involves keeping authors updated about the status of their manuscript. This may include providing an explanation to the author(s) if the review process is falling behind the stated expectations.

T3 – Continuous monitoring and improvement

- Journal teams should take active steps to improve timeliness through regular (quarterly or annual) audits of their workflow.

Given the increasing use of electronic editorial office systems, it is now relatively easy to report not only on median time to decision but also on the time taken for each stage of the process. Therefore, journal teams can drill down and identify what might be causing delays. Identifying these problems is not enough. Journal teams need to take active steps towards resolving any inefficiencies identified (Epstein, Wiseman, Salaria, & Mounier-Jack, 2017).

- Journal teams need to ensure that reviewer databases are kept up to date to prevent unnecessary delays in contacting reviewers and to ensure well-performing reviewers are identified for future reference.
- Journal teams should consider using automated tools where possible, such as a reviewer finder tool or screening software, to aid faster manuscript processing without compromising quality. Journals should list on their website the technologies they use.

There is great potential in automated tools to speed up review processes. In principle, any systematic activity can be achieved more swiftly by an automated process than by a manual

one. The advent of machine learning creates opportunities for more complex tasks, such as identifying reviewers (Mrowinski, Fronczak, Fronczak, Ausloos, & Nedic, 2017), editorial screening, and statistical review, to be undertaken more swiftly and more rigorously than by human intervention. (Although a future where computers, rather than editors, assess reviewer reports and make decisions is still a long way off; Sizo *et al.*, 2018.)

We are not making recommendations about which tools should be used as this will be specific to the needs of the journals and its review process.

The balance is needed to ensure that automation is not used at the expense of integrity. Anecdotally, there is reluctance amongst some editors and reviewers about reviewers being selected algorithmically. In part, these concerns are the consequence of simplistic keyword searches, which can produce tangential (or even far-fetched) correspondences between papers and reviewers. However, such concerns can be mitigated by appropriate application and will ultimately be allayed by improvements in the systems. Given that, currently, the burden of reviewing is distributed unevenly across regions (Gaston & Smart, 2018; Warne, 2016) and across genders (Lerback & Hanson, 2017; Helmer *et al.*, 2017; Steinberg, Skae, & Sampson, 2018, and see https://publons.com/blog/spread-of-peer-review-workload/), falling disproportionately on a small pool of reviewers (Sipior, 2018), it can no longer be acceptable for journal teams to rely on personal networks to discover reviewers.

CONCLUSIONS/NEXT STEPS

The future of peer review is better peer review, both in the perception of its stakeholders and in its application. This means a peer review process that is focussed on Integrity, whilst upholding standards of Ethics, Fairness, Usefulness, and Timeliness. This also means journal teams making themselves accountable to their stakeholders for upholding these standards by making their policies and procedures transparent. As part of this project, we have devised a checklist that can be used by journal teams to evaluate their existing systems and make changes and improvements where possible. This checklist is published as an online Appendix to this article.

We encourage journal teams to adopt the recommendations we have made in this article as they aspire to provide higher standards of peer review.

AUTHOR CONTRIBUTIONS

All authors contributed to the design of the work and to drafting, revising, and approval of this version of the article. TG conducted the literature review, with input from the other authors.

CONFLICT OF INTEREST

The authors all work for Wiley. In addition, CG volunteers at COPE, the Committee on Publication Ethics; HW and MW volunteer at ISMTE, International Society of Managing and Technical Editors.

SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article:
Appendix S1 Checklist for self-assessment of better peer review processes.

REFERENCES

Atjonen, P. (2018). Ethics in peer review of academic journal articles as perceived by authors in the educational sciences. *Journal of Academic Ethics*, *16*(4), 359–376. https://doi.org/10.1007/s10805-018-9308-3

Avital, M. (2018). Peer review: Toward a blockchain-enabled market-based ecosystem. *Communications of the Association for Information Systems*, *42*, 28. https://doi.org/10.17705/1CAIS.04228

Bastian, H. (2017, 31 October). The fractured logic of blinded peer review in journals. *Absolutely Maybe blog* [Web log post]. Retrieved from http://blogs.plos.org/absolutely-maybe/2017/10/31/the-fractured-logic-of-blinded-peer-review-in-journals/

Beyond the Book. (2015, 7 December). *Transcript: Publishing innovation the Lean Six Sigma Way*. Retrieved from http://beyondthebookcast.com/transcripts/publishing-innovation-the-lean-six-sigma-way/

Blum, K., Jacobs, W., Modestino, E. J., DiNubile, N., Baron, D., McLaughlin, T., … Badgaiyan, R. D. (2018). Insurance companies fighting the peer review empire without any validity: The case for addiction and pain modalities in the face of an American drug epidemic. *SEJ Surgery and Pain*, *1*(1), 1–11.

Bornmann, L., & Daniel, H.-D. (2010). How long is the peer review process for journal manuscripts: A case study on Angewandte Chemie International Edition. *Chimia International Journal for Chemistry*, *64*(1), 72–77.

Burns, C. S., & Fox, C. W. (2017). Language and socioeconomics predict geographic variation in peer review outcomes at an ecology journal. *Scientometrics*, *113*(2), 1113–1127. https://doi.org/10.1007/s11192-017-2517-5

Chan, A., Pello, A., Kitchen, J., Axentiev, A., Virtanen, J. I., Liu, A., & Hemminki, E. (2017). Association of trial registration with reporting of primary outcomes in protocols and publications. *Journal of the American Medical Association*, *318*(17), 1709–1711. https://doi.org/10.1001/jama.2017.13001

Collins, E. M., & Bassat, Q. (2018). The scientific integrity of journal publications in the age of 'fake news'. *Journal of Tropical Pediatrics*, *64*(5), 360–363.

Curtin, P. A., Russial, J., & Tefertiller, A. (2017). Reviewers' perceptions of the peer review process in journalism and mass communication. *Journalism & Mass Communication Quarterly*, *95*(1), 278–299. https://doi.org/10.1177/1077699017736031

D'Andrea, R., & O'Dwyer, J. P. (2017). Can editors save peer review from peer reviewers? *PLoS One*, *12*(10), e0186111. https://doi.org/10.1371/journal.pone.0186111

Dali, K., & Jaeger, P. T. (2018). Beyond scholarly publishing: The human dimension of peer review in LIS. *The Library Quarterly*, *88*(2), 99–124.

Davidoff, F. (2004). Improving peer review: Who's responsible? *BMJ*, *328*, 657. https://doi.org/10.1136/bmj.328.7441.657

Dunlap, R. E., & Jacques, P. J. (2013). Climate change denial books and conservative think tanks: Exploring the connection. *American Behavioral Scientist*, *57*(6), 699–731. https://doi.org/10.1177/0002764213477096

Engqvist, L., & Frommen, J. G. (2008). Double-blind peer review and gender publication bias. *Animal Behaviour*, *76*(3), e1–2.

Epstein, D., Wiseman, V., Salaria, N., & Mounier-Jack, S. (2017). The need for speed: the peer-review process and what are we doing about it? *Health Policy and Planning*, *32*(10), 1345–1346. https://doi.org/10.1093/heapol/czx129

Esarey, J. (2017). Does peer review identify the best papers? A simulation study of editors, reviewers, and the scientific publication process. *PS: Political Science & Politics*, *50*(4), 963–969. https://doi.org/10.1017/S1049096517001081

Etkin, A., Gaston, T., & Roberts, J. (2017). Peer review: Reform and renewal in scientific publishing. *ATG Media*.

Fay, M. (1993). Gender bias and the availability of business loans. *Journal of Business Venturing*, *8*(4), 363–376. https://doi.org/10.1016/0883-9026(93)90005-P

Ferris, L. E., & Brumback, R. A. (2010). Academic merit, promotion, and journal peer reviewing: The role of academic institutions in providing proper recognition. *Journal of Child Neurology*, *25*(5), 538–540. https://doi.org/10.1177/0883073810365011

Fox, C. W., Burns, C. S., Muncy, A. D., Meyer, J. A., & Thompson, K. (2017). Author-suggested reviewers: Gender differences and influences on the peer review process at an ecology journal. *Functional Ecology*, *31*, 270–280. https://doi.org/10.1111/1365-2435.12665

Gaston, T., & Smart, P. (2018). What influences the regional diversity of reviewers: A study of medical and agricultural/biological sciences journals. *Learned Publishing*, *31*(3), 189–197. https://doi.org/10.1002/leap.1155

Godlee, F., Smith, J., & Marcovitch, H. (2011, 2011). Wakefield's article linking MMR vaccine and autism was fraudulent. *BMJ*, *342*, c7452. https://doi.org/10.1136/bmj.c7452

Grayson, L. (2002). *Evidence based policy and the quality of evidence: Rethinking peer review*. London, England: Centre for Evidence Based Policy and Practice (ESRC).

Grundy, Q., Dunn, A. G., Bourgeois, F. T., Coiera, E., & Bero, L. (2018). Prevalence of disclosed conflicts of interest in biomedical research and associations with journal impact factors and altmetric scores. *Journal of the American Medical Association*, *319*(4), 408–409. https://doi.org/10.1001/jama.2017.20738

Hartley, J., & Cabanac, G. (2017). The delights, discomforts, and downright furies of the manuscript submission process. *Learned Publishing*, *30*, 167–172. https://doi.org/10.1002/leap.1092

Heidari, S., Babor, T. F., de Castro, P., Tort, S., & Curno, M. (2016). Sex and gender equity in research: Rationale for the SAGER guidelines and recommended use. *Research Integrity and Peer Review*, *1*, 2. https://doi.org/10.1186/s41073-016-0007-6

Helgesson, G., & Eriksson, S. (2018). Revise the ICMJE recommendations regarding authorship responsibility! *Learned Publishing*, *31*, 267–269. https://doi.org/10.1002/leap.1161

Helmer, M., Schottdorf, M., Neef, A., & Battaglia, D. (2017). Gender bias in scholarly peer review. *eLife*, *6*, e21718. https://doi.org/10.7554/eLife.21718

Hirst, A., & Altman, D. G. (2012). Are peer reviewers encouraged to use reporting guidelines? A survey of 116 Health Research journals. *PLoS One*, *7*(4), e35621. https://doi.org/10.1371/journal.pone.0035621

Le Goues, C., Brun, Y., Apel, S., Berger, E., Khurshid, S., & Smaragdakis, Y. (2018). Effectiveness of anonymization in double-blind review. *Communications of the ACM*, *61*(6), 30–33.

Le Noury, J., Nardo, J. M., Healy, D., Jureidini, J., Raven, M., Tufanaru, C., & Abi-Jaoude, E. (2015). Restoring study 329: Efficacy and harms of paroxetine and imipramine in treatment of major depression in adolescence. *BMJ*, *351*, h4320.

Lee, C. J., Sugimoto, C. R., Zhang, G., & Cronin, B. (2012). Bias in peer review. *Advances in Information Science*, *64*(1), 2–17. https://doi.org/10.1002/asi.22784

Lerback, J., & Hanson, B. (2017). Journals invite too few women to referee. *Nature*, *541*, 455–457. https://doi.org/10.1038/541455a

Liang, Y. (2018). Should authors suggest reviewers? A comparative study of the performance of author-suggested and editor-selected reviewers at a biological journal. *Learned Publishing*, *31*, 216–221. https://doi.org/10.1002/leap.1166

Link, A. M. (1998). US and non-US submissions: An analysis of reviewer bias. *Journal of the American Medical Association*, *280*(3), 246–247. https://doi.org/10.1001/jama.280.3.246

Macleod, M. R. (2017). Findings of a retrospective, controlled cohort study of the impact of a change in *Nature* journals' editorial policy for life sciences research on the completeness of reporting study design and execution. *bioRxiv*. https://doi.org/10.1101/187245

Merry, L., Jarvis, K., Kupoluyi, J., & Jomama Lual, J. O. (2017). Doing peer review: Reflections from an international group of postdoctoral fellows. *Journal of Research Practice*, *13*(2), V2. Retrieved from http://jrp.icaap.org/index.php/jrp/article/view/579/475

Messias, A. M. V., Lira, R. P. C., Furtado, J. M. F., de Paula, J. S., & Rocha, E. M. (2017). How to evaluate and acknowledge a scientific journal peer reviewer: A proposed index to measure the performance of reviewers. *Arquivos Brasileiros de Oftalmologia*, *80*(6), V. https://dx.doi.org/10.5935/0004-2749.20170084

Michael, A. (2015, 26 March). Ask the chefs: How can we improve the article review and submission process? *Scholarly Kitchen blog* [Web log post]. Retrieved from https://scholarlykitchen.sspnet.org/2015/03/26/ask-the-chefs-how-can-we-improve-the-article-review-and-submission-process/

Mrowinski, M. J., Fronczak, P., Fronczak, A., Ausloos, M., & Nedic, O. (2017). Artificial intelligence in peer review: How can evolutionary computation support journal editors? *PLoS One*, *12*(9), e0184711. https://doi.org/10.1371/journal.pone.0184711

Mulligan, A., Hall, L., & Raphael, E. (2013). Peer review in a changing world: An international study measuring the attitudes of researchers. *Journal of the American Society for Information Science and Technology*, 64(1), 132–161. https://doi.org/10.1002/asi.22798

Nature. (2006). Overview: *Nature's* peer review trial. *Nature*. https://doi.org/10.1038/nature05535

Nguyen, V. M., Haddaway, N. R., Gutowsky, L. F. G., Wilson, A. D. M., Gallagher, A. J., Donaldson, M. R., ... Cooke, S. J. (2015). How long is too long in contemporary peer review? Perspectives from authors publishing in conservation biology journals. *PLoS One*, 10(8), e0132557. https://doi.org/10.1371/journal.pone.0132557

Nicholas, D., Watkinson, A., Jamali, H. R., Hermna, E., Tenopir, C., Volentine, R., ... Levine, K. (2015). Peer review: Still king in the digital age. *Learned Publishing*, 28, 15–21. https://doi.org/10.1087/20150104

Page, M. J., Altman, D. G., Shamseer, L., McKenzie, J. E., Ahmadzai, N., Wolfe, D., ... Moher, D. (2017). Reproducible research practices are underused in systematic reviews of biomedical interventions. *Journal of Clinical Epidemiology*, 94, 8–18. https://doi.org/10.1016/j.jclinepi.2017.10.017

Pashler, H., & Harris, C. R. (2012). Is the replicability crisis overblown? Three arguments examined. *Perspectives on Psychological Science*, 7(6), 531–536. https://doi.org/10.1177/1745691612463401

Peterson, G. I. (2018). Postpublication peer review: A crucial tool. *Science*, 359(6381), 1225–1226. https://doi.org/10.1126/science.aas9490

Powell, K. (2016, 10 February). Does it take too long to publish research? *Nature News* [Web log post]. Retrieved from www.nature.com/news/does-it-take-too-long-to-publish-research-1.19320

Publishing Research Consortium. (2016). *Publishing research consortium peer review survey 2015*. London, England: Mark Ware Consulting. Retrieved from http://publishingresearchconsortium.com/

Roberts, J. (2018). Predatory journals: Know thy enemy – What editorial offices can do to educate their stakeholders. *Editorial Office News*, 11, 4–8. https://doi.org/10.18243/eon/2017.10.11.2

Rodgers, P. (2017). Decisions, decisions. *eLife*, 6, e32011. https://doi.org/10.7554/eLife.32011

Rodriguez-Bravo, B., Nicholas, D., Herman, E., Boukacem-Zeghmouri, C., Watkinson, A., Xu, J., ... Swigon, M. (2017). Peer review: The experience and views of early career researchers. *Learned Publishing*, 30(4), 269–277. https://doi.org/10.1002/leap.1111

Ross-Hellauer, T. (2017). What is open peer review? A systematic review. *F1000Research*, 6, 588, 10.12688/f1000research.11369.2.

Rowley, J. R., & Sbaffi, L. (2017). Academics' attitudes towards peer review in scholarly journals and the effect of role and discipline. *Journal of Information Science*, 44(5), 644–657. https://doi.org/10.1177/0165551517740821

Sipior, J. C. (2018). Peer reviewer non-performance: The need to replenish the "Commons". *Communications of the Association for Information Systems*, 42, 27. https://doi.org/10.17705/1CAIS.04227

Sizo, A., Lino, A., & Rocha, Á. (2018). Assessing review reports of scientific articles: A literature review. In Á. Rocha, H. Adeli, L. P. Reis, & S. Costanzo (Eds.), *Trends and advances in information systems and technologies. WorldCIST'18 2018. Advances in Intelligent Systems and Computing*. (Vol. 745). Cham: Springer.

Steinberg, J. J., Skae, C., & Sampson, B. (2018). Gender gap, disparity, and inequality in peer review. *The Lancet*, 391(30), 2602–2603.

Steinpreis, R. E., Anders, K. A., & Ritzke, D. (1999). The impact of gender on the review of the curricula vitae of job applicants and tenure candidates: A national empirical study. *Sex Roles*, 41, 509. https://doi.org/10.1023/A:1018839203698

Tafuri, S., Martinelli, D., Prato, R., & Germinario, C. (2011). From the struggle for freedom to the denial of evidence: History of the anti-vaccination movements in Europe. *Annali di Igiene: Medicina Preventiva e di Comunita*, 23(2), 93–99.

Tamblyn, R., Girard, N., Qian, C. J., & Hanley, J. (2018). Assessment of potential bias in research grant peer review in Canada. *CMAJ*, 190(16), E489–E499. https://doi.org/10.1503/cmaj.170901

Teplitskiy, M., Acuna, D., Elamrani-Raoult, A., Körding, K., & Evans, J. (2018). The sociology of scientific validity: How professional networks shape judgement in peer review. *Research Policy*, 47(9), 1825–1841.

Tomkins, A., Zhang, M., & Heavlin, W. D. (2017). Reviewer bias in single- versus double-blind peer review. *Proceedings of the National Academy of Sciences of the United States of America*, 114(48), 12708–12713. https://doi.org/10.1073/pnas.1707323114

Tuckett, A. G., & Kangasniemi, M. (2017). Why we need a golden rule for peer review. *Nursing Ethics*, 24(8), 875–877. https://doi.org/10.1177/0969733017742993

Turner, L. (2003). Promoting F.A.I.T.H. in peer review: Five Core attributes of effective peer review. *Journal of Academic Ethics*, 1(2), 181–188.

Tushingham, S., Fulkerson, T., & Hill, K. (2017). The peer review gap: A longitudinal case study of gendered publishing and occupational patterns in a female-rich discipline, Western North America (1974–2016). *PLoS ONE*, 12(11), e0188403.

van Rooyen, S., Black, N., & Godlee, F. (1999). Development of the review quality instrument (RQI) for assessing peer reviews of manuscripts. *Journal of Clinical Epidemiology*, 52(7), 625–629.

Walker, R., Barros, B., Conejo, R., Neumann, K., & Telefont, M. (2015). Personal attributes of authors and reviewers, social bias and the outcomes of peer review: A case study. *F1000Research*, 4, 21. https://doi.org/10.12688/f1000research.6012.2

Warne, V. (2016). Rewarding reviewers – Sense or sensibility? A Wiley study explained. *Learned Publishing*, 29, 41–50. https://doi.org/10.1002/leap.1002

Wicherts, J. M. (2016). Peer review quality and transparency of the peer-review process in open access and subscription journals. *PLoS One*, 11(1), e0147913. https://doi.org/10.1371/journal.pone.0147913

Zaharie, M. A., & Seeber, M. (2018). Are non-monetary rewards effective in attracting peer reviewers? A natural experiment. *Scientometrics*, 117(3), 1587–1609. https://doi.org/10.1007/s11192-018-2912-6