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EXPERT OPINION

Making Conventional Peer Review More Efficient: Are Amalgamated Pre-Submission Peer Review and Preprint Models Helpful?

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ABSTRACT

The peer-review burden is a serious threat to the scholarly community. Although journal editors, publishers, and professional associations promote its essence through expert guidance, training modules, and explanatory flowcharts, there is a massive demand to scrutinize thousands of research outputs. Lack of willingness to aid ample time, overload, and transparency issues make this time-consuming process even more complicated, resulting in delayed journal responses, non-publication of manuscripts, and author frustrations. Pre-submission peer reviews by professionally appointed experts of science writing/editing agencies, the readers' comments, and feedback in preprint servers may help reduce the load on the conventional journal peer review system. Professional peer review through commercial agencies tends to improve manuscript quality by identifying significant reasons for rejection, citing priority issues, providing constructive feedback, and suggestions to rectify the noticed lacunas, they also identify different ways to correct errors, ultimately enhancing the chances of acceptance with the journals. Preprints, on the other hand, also undergo an informal peer review through readership that helps authors to refine their manuscripts. The big publishing houses and leading scholarly associations cautiously encourage the newly breeding preprint culture by laying down guidelines or policies and asking authors for proactive declaration. However, it is essential to openly advertise the downsides of preprints. Here, we propose an amalgamation of the preprint-journal system to improve the current process properly with the option of a professional pre-submission peer-review process. A viable, risk-based approach is suggested by modifying these two journal-independent processes to suit publishers' requirements.

KEYWORDS

Peer review; pre-submission check; preprints; scholarly publishing; portable peer review

INTRODUCTION

Peer review refines the manuscript, making the research reliable and reproducible. It subjects a research output or ideas to a critical inspection by professionals with domain knowledge[1]. Reviewer applies their expertise and provides an impartial report on the manuscript[2]. These reviewers specifically verify methodological robustness, confounders, the correctness of data interpretations, and ethical aspects of research. They also check that the manuscript satisfies the journal requirements[3]. Although the review process in most journals does not follow a checklist of tasks, the Committee on Publication Ethics (COPE) offers a guideline that provides the steps and method of reviewing an article[4]. The peer-review process is governed by the journal and is the editorial team's primary task. In addition, the collaboration of external subject experts with the editorial team ensures quality by maintaining 'unrestrained criticism'[5].

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The concept of scholarly peer review started much later after the first medical journals were published in the United States (US; year: 1731) and the United Kingdom (UK; year: 1797)[6,7]. However, a form of peer review did exist in the early 18th century. Back then, memoirs were sent through correspondences to subject experts, or internal committees were formed to review articles[8]. *The Lancet* started getting its submissions reviewed after 1976 when doctors in the US showed reservations while accepting non-reviewed articles[5,9]. *The British Medical Journal* had been following a peer review process since 1893, while the *Journal of the American Medical Association* rarely chose to send articles for external review[5,10]. Thus, historically, the peer review process followed no standard procedure, and even in the current state of affairs, different journals and publishers have their policies regarding this task.

Peer review processes currently in practice

There are different ways in which peer review is carried out. In an open peer review process, the author and the reviewer know the identity of each other. In a single-blind system, the reviewer's identity is not disclosed to the authors, while in a double-blind system, neither the author nor the reviewer is aware of each other[2]. Journals maintain a pool of reviewers, who often provide their services voluntarily. The task of getting an article peer-reviewed is a long-drawn procedure, even though journals have set machinery in place and usually have a dedicated peer-review management team. Therefore, authors often get frustrated due to the long wait time.

Limitations of the conventional method

Peer review, being a significant step in evaluating the quality of research, must be efficient in terms of quality output and time taken. To improve efficiency, peer reviewers must be allowed to focus on what matters the most. Time-consuming steps, such as correcting language quality, the accuracy of references, and the novelty of the research, can be made more efficient by applying artificial intelligence and automation principles[11,12]. In addition to the inherent limitations due to the type of peer review, it also suffers from the inaccessibility of qualified peer reviewers and those who can spend ample time reviewing manuscripts. It is estimated that merely 20% of researchers handle up to 94% of peer review-related tasks[13]. Peer review is not an 8-hour office job, nor can it be a leisure activity[14]. In-depth evaluation of research work requires dedication and time. Often employed researchers serve as honorary peer-reviewers because reviewing augments their knowledge and works as continuing education for them. Organizations and universities should encourage their employees to play this much-needed role more efficiently. They may help by providing a scheduled break during the working hours or a dedicated day during the week for this self-directed learning. Regrettably, researchers limit themselves from treading the path because they are already burdened with academics and other administrative tasks.

Nevertheless, peer reviewers are an essential support system, and they broaden the editorial back-up in sieving out articles and helping in publishing good research[14]. An international survey of academics called 'Sense About Science' reported that overwork is one reason researchers decline to review articles. The time it takes to review a paper is six hours on average. The survey also found that one in 100 academics reported spending more than 100 hours reviewing a piece[15]. This shows how much work goes into peer review. It is an uphill battle for journals to get articles checked that are from niche specialties. Journals may have to reject or delay submissions due to the lack of availability of appropriate peer reviewers. However, the non-availability of proper reviewers and the lack of timely peer review comments from authors are major challenges most scholarly journals face. To mitigate the delays in manuscript processing, editors must find ways to process manuscripts faster and identify alternatives or modifications to the conventional peer-review process. This is where the pre-submission peer reviews provide some respite to the authors.

Concept of pre-submission peer review

As the name indicates, pre-submission peer review occurs before a manuscript is officially submitted to a journal for conventional peer review. The scholarly world can consider two types of pre-submission peer review: a) professional pre-submission peer review performed by a science editing or writing agency and b) preprints. In both cases, the initial peer review is conducted independently of the journal. Pre-submission peer review helps reduce the burden on the journal's peer review system. However, one must always be aware of the appropriateness and transparency of the process.

Professional pre-submission peer review

Professional pre-submission peer review is a service offered by many writing and editing agencies. In this 'active review' process, the agency sends submission-ready manuscripts to subject matter experts and pays them for their time and efforts. This peer review is usually guided by a defined checklist that mimics conventional journal peer review

forms and, in some cases, is more detailed. The checklist has provisions for validating compliance with journal requirements like novelty or significance of the study, presentation of results, suitability of study design, ethical compliance, and language quality. It usually focuses on the main elements of a research manuscript, including ethical considerations, statistics, methodology, logical flow, and journal requirements. These reviewers improve the quality of the manuscript by identifying major reasons for rejection, citing the priority issues, providing constructive feedback, suggesting ways to rectify the noticed lacunas or errors, thereby, ultimately enhancing the chances of manuscript acceptance by the journals[16,17]. These services may ideally be suitable for entry-level researchers or senior researchers who are busy with research tasks and may not spot minor data or language errors. Although this type of peer review requires a domain expert, however, agencies may use a scholarly publishing professional with a much broader experience than a subject expert. Unfortunately, it points to the lack of in-depth scientific analysis during the professional pre-submission peer review[16,17]. Additionally, since it is a paid service, so, not every author can afford it. Practically, the revised manuscript is not returned to the reviewer to ensure that the feedback is adequately addressed. Therefore, the final quality of the manuscript is not guaranteed.

Preprints

Preprints are not peer-reviewed and are available freely online before being published formally by a journal. Although no peer review is performed, about 82% of 57 preprint servers evaluated in a 2020 study tend to conduct an initial submission screening[18]. However, another study in the same year that systematically evaluated 44 preprint servers concluded that only 32% of them utilize the service of researchers with relevant context expertise in some screening processes[19].

Though preprints are a relatively new method of scholarly communication in medicine, physicists have been using preprints on *arXiv* since 1991[20]. Some other preprint platforms include *MedRxiv*, *PrePrints.org*, *PeerJ PrePrints*, *engrXiv*, *ChemRxiv*, *Authorea*, *JMIR Preprints*, *SSRN*, *Zenodo*, *SciELO*, *viXra*, and *PsyArXiv*[18,19,21]. Malički *et al.* listed over 50 preprint servers[18]. Interestingly, new platforms like *preLights* and *PREreview* have emerged to discuss and comment openly on the research outputs published in preprint servers[22,23]. Likewise, several preprint-based search and discovery tools have sprouted up; *PrePubMed*, *search.bioPreprint*, *OSF Preprints*, and *Onikle* are some of them[24-27]. An analysis of over 67,000 *bioRxiv* preprints found that almost half are from authors affiliated to institutions in the US and UK (together, 49.7%), indicating the increasing popularity of preprints in the Western world[28]. A trend analysis of *bioRxiv* published in 2019 spotted doubled rate of preprint submission in less than a year, with an 82% hike in readership as measured by the download count, year over year (2018 vs 2017)[29]. This uptrend in the preprint market is a refreshing change for authors who do not want to wait in long queues to get their research published. However, the reverberations of the trend need to be closely monitored.

Do journals and publishers support preprints?

A critical analysis published in *PLoS One* last year evaluated the clarity and information availability of preprint policies in 171 scholarly journals. Surprisingly, most (60.8%) lack precise information on the acceptance of preprints, with 75% not having a policy on citation of preprints[30]. On the contrary, the high-impact journals display a different trend. An exciting article analyzed the preprint policy in the top 100 high-impact clinical journals. Most journals (86%) welcome preprints, and 13% have the policy to have a case-wise independent evaluation, with only one journal does not accept preprints[31]. A 2019 study revealed that about half of *bioRxiv* preprints are getting published in journals of four publishers: *Elsevier*, *Nature*, *PLoS*, and *Oxford University Press*[32]. It is pretty clear that the big publishing houses encourage the newly breeding preprint culture by laying down guidelines and policies and asking authors for proactive declaration [Table 1].

Table 1: Approach of selected publishing houses on preprints

Publishers	Current policy on preprints*
PLOS, SAGE, NEJM	These publishers seem to have a similar approach towards preprints. They encourage authors to submit manuscripts for evaluation even if they are already submitted to preprints. However, they expect the authors to notify the journal about this in advance.
Springer Nature	More liberal in their approach as they allow publishing of preprints even under Creative Commons licenses.
JAMA	Authors need to provide preprint link with details of whether the submitted paper has been revised or differs from the preprint.
IOP Publishing	Supports early sharing of research through preprints but does not accept a manuscript if ownership/copyright is transferred.

* Information available from their respective websites

Preliminary checks of preprints

In *bioRxiv*, approximately 30% of submissions undergo a review at least once[33]. Such open correspondences might even lead to newer avenues of research and collaborations between the author and the reader. Preprints are believed to stabilize the adverse effects that big data brings into scholarly research. They may encourage researchers to report null or negative findings and help perform more comprehensive methodological reviews[34]. Another advantage is that the authors do not have to consider the 'aesthetics' of the manuscript because there is no format followed by preprint servers, unlike journals.

Of the 12 preprint servers studied by Nouri *et al.*,[21] only two feature immediate availability. Though others conduct a preliminary check which takes a maximum of 5 days, no set format or guideline is followed. Hence, there is always a concern about ethical misconduct and methodological flaws of the research. Moreover, a preprint article does not undergo a re-evaluation check, different from how a journal works. All the 57 preprint servers analyzed by Malički *et al.*[18] ask for scholarly scope during submission of preprints. In contrast, only about half of them ask for the study type, and only 39% seek data sharing information. Paradoxically, presenting this argument will not hold much ground because there are many instances where reputed journals had to retract articles due to data errors or unethical practices or an irremissible COI[35] - all these being peer-reviewed and checked by professional editors.

Citations & indexing of preprints

The early launch of the manuscript has generated a large number of citations. It encourages the idea of "Plan U" –free universal access to research outputs[36]. Servers, such as *Crossref* and *bioRxiv,* link preprints to their published versions. Therefore, the different forms of a manuscript remain threaded to each other.

The credibility of preprints is on the rise. The US National Institutes of Health and Wellcome Trust started accepting preprint citations in grant applications in 2017[37,38]. Since preprints are works in progress, the limitations that accompany them, like the validity of findings or methodological strength, should be well-judged by the researcher, deciding to site them. Researchers who cite preprints must make sure to site the latest version of the article. The most important consideration here is that the results of the preprint article have yet to be endorsed by the scientific community.

There is a greater reluctance to accept preprints in the field of biology, because unlike the work of physics or mathematics, the drugs or therapies can not undergo frequent amendments, especially based on preprint reports or their subsequent versions.

The concept that preprints receive 'higher' citations is debatable. A 2019 analysis has compared attention and citation parameters of preprints (n=5,405), which are later published in 39 peer-reviewed journals, to that of regular articles (n=68,834). Preprints reportedly have a 49% higher altmetric attention score with 36% increased citation[39]. However, a study of manuscripts present in *arXiv* and *Web of Sciences (WoS)* reveals that preprints are less cited than published versions in *WoS*[40].

Another apprehension is the indexing of articles by leading journal databases. In 2018, *PrePubMed* was launched to index manuscripts from preprint servers, such as *arXiv q-bio*, *PeerJ Preprints*, *bioRxiv*, *PrePrints.org*, and *Nature Precedings*[24]. Articles in *bioRxiv* are indexed by *Google Scholar*, but not by *PubMed/Medline*.

Concerns and issues with preprints

Visibility is the biggest merit of the preprints, but that does not provide credibility to the researcher. As the preprints are not acceptable for determining professional growth or getting research grants[41]. It is now more acutely concerning when there has been a hastened churning of COVID-19 research and an equally glaring subsequent retraction of such articles[42]. A study with a positive outcome naturally grabs more attention, and because preprints are open access, they reach out to the public faster. The strong presence of social networks further helps in promulgating such studies, influencing the layman more, if not the scholarly community. An erroneous preprint may not only affect the scholarly fraternity but also the general public since the news about the flawed research may quickly reach the latter through the media[43]. Journalists reporting on advances in medicine should also play a responsible role[44]. Out of excitement or urge to gain audience attention, they should not scoop findings from preprints and advertise them.

Similarly, a layperson might grab the conclusion of any published material without being concerned about the source or its legitimacy. This can be partially resolved if access to preprints is restricted to academic institutions only[42]; at least the scholars would know that the findings should be accepted with a pinch of salt. Feedback on preprint manuscripts can be manipulated to make the research look scientifically robust and enhance its relevance. This works in favor of the authors, and they may even plant positive reviews through peers. These 'pseudopraises' go unchecked and popularize a not so

Table 2: Arguments for and against preprints[51,52]

Promoting preprints
• Peer review should be conducted with the utmost impartiality. But the process is not guaranteed to be unbiased and perfect. Conflict of interest, prejudice, immorality, and corrupt practices of a reviewer may not be recognized or controlled by a journal. Therefore, the lack of a peer review in a preprint cannot be held against it.
• Funders can observe the progress of a project that helps researchers apply for funding or make them eligible for promotions in the professional arena.
• The idea cannot be stolen because a preprint carries a DOI, which is evidence of an intellectual claim.
• Journals often reject articles due to unconventional or negative findings. These 'lost' or 'hidden' data are made available through preprints as substitute academic platforms.
• There is an ever-increasing demand for advanced therapeutics and diagnostics in the medical sciences. Preprints are a faster medium to inform the fraternity about ongoing research and inventions.
Rebutting Preprints
• Manuscripts have not been subjected to peer review or academic scrutiny. It is difficult to separate pseudoscience or low-quality research from authentic research without a robust peer review.
• The idea can be taken to heart, and a replication of the research can start by working around the limitations of the original study, as stated in the preprint manuscript or if the inspired researcher has made a note of it.
• Preprints simulate how a 'predatory' journal works: no peer review, fast publication, open access, no cost.
• Since most preprint servers post articles in a rapid time, there is little or no quality assessment. As a result, the presence of fraudulent or manipulated data, flawed methodology, and unethical behavior may remain inconspicuous.
• The boom in the preprint market has caused a coalescence between academics and business. It is tough to rely on the server owners/funders to understand if they are working to support academia or boost their economic progress.
• Citing preprints without upholding caution could pose a serious hazard if clinicians unknowingly implement a therapy/procedure, knowing that scholars have not vetted the original work.
• Researchers might rush to make their work public without making conscious efforts to improve quality; because submitting in a preprint server is free of cost, visibility is faster, and the manuscript is citable. Unfortunately, this might lead to the accumulation of bad science in the pool.

influential study that ultimately runs the risk of making its way into medical and clinical practice. Also, the public feedback system can often be derogatory. The questioning of female researchers about their competence and malicious comments could hinder the final publication of the manuscript[45]. Although early criticism or finding flaws may help a researcher, unfair comments are equally detrimental.

Notably, some preprint servers are accused of acting like predatory journals by avoiding the plagiarism detecting tools to crawl their content[46]. This claim is further supported by the results of Malički *et al.*, as the issue of plagiarism is addressed in the publication policies of only 15 of 57 (26%) preprint servers studied[18]. Besides the points discussed in the section, Table 2 highlights the basic themes of a preprint and a conventionally peer-reviewed manuscript that differ and the arguments for and against each process.

The most common conflict that may arise with preprints is duplicity. It would be very confusing if there were multiple unallied versions of an article online. All preprint servers must have a clear and bold alert on their page declaring that the manuscripts they host have not been peer-reviewed. The servers display the citation style to encourage researchers to cite the manuscripts. Still, there is no marker to show that the article is a preprint manuscript, so a less vigilant researcher would not even know that it is a preprint simply by looking at its citation style.

Characteristics of ideal preprints

The preprint servers should ensure that their data remain up-to-date at all times. Articles that are published subsequently in peer-reviewed journals must be linked to the preprints. Furthermore, journals that accept preprints in citations should ask their authors to update the reference list with peer-reviewed published versions[47]. Finally, it is important to increase awareness among authors and researchers of the distinction between a preprint and a published article. Unique citation styles must be used for preprints to be identified from their DOIs. The International Society for Medical Publication Professionals (ISMPP), along with the American and European Medical Writers Associations (AMWA and EMWA), has very recently issued a joint statement on preprint and peer review. The March 2021 statement by these three leading professional associations sheds light on the much-needed directives on handling preprints in this infodemic era. It comes in handy with critical guidance such as watermarking, introducing disclosure statements, and using in-text citation only (and not in bibliographic reference) to clear mentioning the 'no peer review yet' status of preprints[48]. The joint note also

suggests the use of portable peer reviews. *BMC Biology* has introduced a "Transfers and Portable Reviews Policy," by which authors can submit the reviews performed in earlier submissions of their manuscripts to other journals[49]. Similar portable peer review features are also introduced by journals of the same association, domain, or publisher. For instance, the Transplant Peer Review Network set up by seven transplant-specific *Wiley* journals is a notable initiative[50].

How can journals benefit from pre-submission peer reviews?

Accommodating professional pre-submission peer review by journals

As mentioned earlier, even if the professional pre-submission peer review is not 'too scientific,' it helps to improve the quality of the submitted manuscripts and allows the peer reviewers in the journal to focus on the most critical aspects of the manuscripts. Because pre-submission peer review is a service offered by writing agencies, it is part of a business. Although most writing agencies are professionally managed and follow ethical aspects of scholarly publications, issues with transparency of the process and potential scientific misconduct could not be overruled. However, with our experience in scholarly publishing, we propose the authors proactively inform the journal about the professional pre-submission peer review the manuscript undergone, with the identity of the peer reviewer, agency, timeline, peer review feedback, and the way the author addressed the comments (probably in a track changed or annotated version). In this way, the journal editor will get a comprehensive view of the process. This will help the editor decide whether the process was robust enough to conduct only a 'partial peer review' by the peer reviewer of the journal. In such cases, the journal reviewer can concentrate on the areas that are not adequately covered during the professional pre-submission peer review, which will, in turn, make the journal peer review relatively faster, efficient, and ultimately reduce the burden on the journal peer review resources.

Modified preprints

A preprint carries the prospect of being an alternative to conventional peer review. The most vital step towards this is to realize and openly advertise the downsides of a preprint. For example, the outcome interpretations should be restrained, while the overall integrity of the preprint process should be transparent, which will build trust among the scholarly community towards preprints. Considering different prospects, we sincerely expect scholarly journals to leverage the positive aspects of preprints to ensure an efficient peer review system.

In this context, we propose an amalgamation of the preprint-journal system (Figure 1). An independent preprint repository may be formed where journals deposit manuscripts (with author's consent), for which they do not have immediate availability of appropriate reviewers. Like any other preprints, these manuscripts are open to reader comments. At the same time, the journal has the privilege of accessing and monitoring the comments of the reader and the reviewer and all relevant changes, ensuring transparency of activities. After evaluating (until a pre-defined timeline) the readers' feedback and authors' revisions, the journal may decide to publish the article

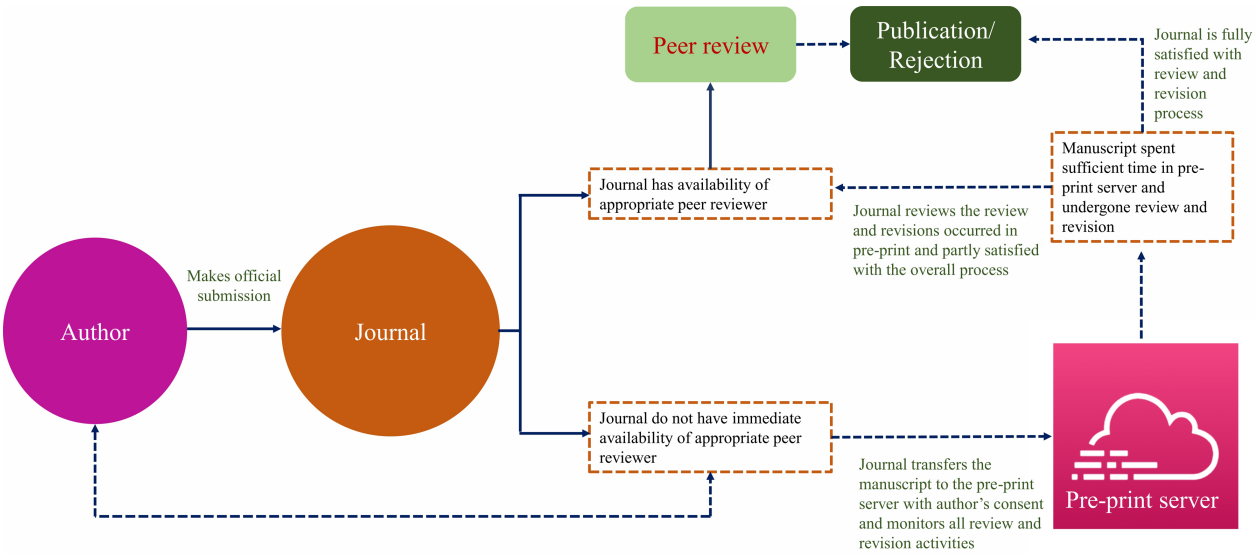

Figure 1: The proposed amalgamation of the preprint-journal system

directly or run it through their regular peer review system. If the journal fails to publish the article on time or chooses not to publish it, another journal registered in the repository may pick it up with the author's permission. This is how the process may go on without the author having to wait for an uncertain period. This would make the process transparent and channelize the article to follow a predetermined path.

CONCLUSIONS

Improving the efficiency of peer review is important to safeguard the integrity and timeliness of published research. Improving the current peer review process could be one strategy. A risk-based approach should be adapted to improve the conventional process. Since the pre-submission peer review is not a new concept and has been used by many authors, inculcating positive aspects of both professional pre-submission peer review and preprints and modifying it to suit journal requirements seem to be a viable option. However, this requires changes in the journal's policy and detailed deliberations among editorial associations, including the Asian Council of Science Editors, AMWA, EMWA, COPE, ICMJE, ISMPP, and European Association of Science Editors. Consensus statements from these professional bodies on the proposals made here will encourage journals to follow these processes.

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Not Applicable

AUTHOR CONTRIBUTIONS

SM conceived the review idea. HI conducted the literature search. SM prepared the first draft of the manuscript. HI reviewed, edited, and revised the manuscript substantially on the key intellectual content. Both the authors finalized and approved the current version agreed to be accountable for accuracy and integrity and decided to submit the manuscript to Trends in Scholarly Publishing.

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