

Viewpoint

Structured peer review: implementation and checklist development

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Received: 26 Sep 2024

Accepted: 18 Nov 2024

Published: 9 Dec 2024

Authors' Contributions

Per CRediT

BM: Writing – original draft,
Writing – review & editing, MM:
review & editing.

Additional ICMJE criteria

All authors approved this version to be published, agreed to be accountable for their contributions, and agreed to address any questions related to the accuracy or integrity of any part of the work, including parts they were not personally involved in.

Acknowledgments

The authors would like to thank the editors of the journals who agreed to work with the rather strict set of core questions they introduced.

Code Availability

No code was used in this study.

Data Availability

No new data are presented in this report.

Funding

No funding was received for this Viewpoint.



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Citation

Mehmani B, Malički M. Structured peer review: implementation and checklist development. *Eur Sci Ed.* 2024;50:e137675.

<https://doi.org/10.3897/ese.2024.e137675>

Ethics Approval

No ethics approval was needed as this is an opinion piece.

**Presentations at meetings/
conferences**

This manuscript is a follow-up to a recently published paper by the same authors: <https://peerj.com/articles/17514/>, and the opinion piece of MM: <https://www.nature.com/articles/d41586-024-01101-9>

The authors presented preliminary results as a poster at the Metascience 2023 Conference held on May 9–10, 2023, in Washington, DC, USA. MM received a travel reward for postdocs that covered his registration fee and \$300 to help with travel and accommodation costs. They also presented preliminary results as an oral presentation at the PubMet Conference, September 13–15, in Zadar, Croatia.

Preprint availability

This is the first preprint version of the checklist.

**Protocol and analysis plan
availability**

None.

Reporting

None.

Statement of Interests

Mario Malički is Editor-in-Chief of the Research Integrity and Peer Review journal. BM is an employee of Elsevier, the publisher of the journals implemented structured peer review, and the owner of the submission system used for piloting the structured peer review. Elsevier is also the owner of the Scopus database which was used to select journals from different impact factor quartiles and subject areas. MM is member of the Advisory Board of European Science Editing. BM is vice president of EASE.

Abstract

To address the low overlap between reviewer comments and the publication recommendations they make, as well as to suggest guidance on what kind of peer review report would benefit journals and editors the most, we introduced structured peer review to Elsevier journals and analyzed its effect in our June 2024 paper: peerj.com/articles/17514/. To further promote the implementation of the structured peer review process and help reviewers prepare thorough review reports, in this paper, we present our set of structured peer review questions in a checklist format.

Keywords:

Peer review, peer review instructions, peer review quality, scholarly publishing, structured peer review

Introduction

While peer review is considered one of the best ways for ensuring scientific rigour, a lack of clear guidance might result in the sub-optimal evaluation of a manuscript. Not all reviewers know what is expected of them, and they might not have the expertise to assess all aspects of a manuscript.¹ This means that poorly executed, inaccurate, or even harmful content can end up as a peer reviewed version of the record in the body of science.

The Committee on Publication Ethics (COPE) peer review guidelines recommends that editors aim to receive two review reports for a manuscript,² with current data indicating this practice.^{3: preprint} However, the low agreement rate between two or more reviewers of a manuscript was shown in a systematic review on the topic published in 2010⁴ and reconfirmed in our recent study of review reports from 2416 Elsevier journals^{3: preprint} can cause delays in publication, unjust rejection, and author confusion. Furthermore, a 2014 published study showed that reviewers are very often uncertain in the recommendations they made.⁵

To address these issues, in 2022, we introduced a set of questions for research articles that reviewers needed to answer before proceeding with their free-text comments to authors. We then analyzed reviewer responses to these questions and their agreement rates, comparing them with the journals' historical data, and found that the implementation of the structured peer review significantly improved inter-rater agreement and the number of aspects of the manuscripts on which the reviewer commented.⁶ The original questions we implemented for this analysis in 2022 are presented in Table 1.

Elsevier's user research team separately ran interview sessions with editors, reviewers, and authors of the pilot journals in 2023, asking

about their experience with these questions and how they compare to the previous unstructured peer review format. In total, 13 editors from seven countries and three subject areas, 11 reviewers from four countries and four subject areas, and six authors from four countries and three subject areas participated in these interview sessions.

Combining our findings from the analysis of the reviewers' responses and interviewees' feedback, we revised our list of questions and present them here as a checklist.

Structured peer review checklist

Our list of questions follows the structure of a typical research manuscript, that is, IMRaD (Introduction, Methods, Results, and Discussion), which was recommended in the early 20th century and became almost universally adopted, especially in biomedical journals, in the 1970s.⁷

We chose two questions per section, in order to not overburden the reviewers while directing their focus on the core aspects needed for assessing the quality of evidence and the quality of reporting of the study. We encourage editors to treat the list as highly adaptable by removing or adding specific questions specifically needed in their fields, for example, questions on theory, code or data sharing, computational reproducibility, etc. Any added questions should ideally follow the same response template and be clearly introduced to the journal reviewers and authors. We recommend these questions be implemented in a multiple-choice style, with the last answer option having a free text field in which reviewers should provide constructive criticism to the authors on how to improve their manuscript. This should allow for better readability and comparisons for authors and editors, as well as easier implementation for any meta-research studies on the topic. The answer choices we recommend are:

Table 1. Original Peer Review Checklist⁶

Question ((When answering questions, we recommend that you number each suggestion so that the author(s) can more easily respond))	Answer (mark as appropriate with an “x”)
1. Are the objectives and the rationale of the study clearly stated?	<ul style="list-style-type: none"> • Yes [<input type="checkbox"/>] • No [<input type="checkbox"/>] • Not applicable [<input type="checkbox"/>] Provide further comment in the free text field
2. If applicable, is the method/study reported in sufficient detail to allow for its replicability and/or reproducibility?	<ul style="list-style-type: none"> • Yes [<input type="checkbox"/>] • No [<input type="checkbox"/>] • Not applicable [<input type="checkbox"/>] Provide further comment in the free text field
3. If applicable, are statistical analyses, controls, sampling mechanisms, and statistical reporting (e.g., <i>P</i> -values, CIs, effect sizes) appropriate and well described?	<ul style="list-style-type: none"> • Yes [<input type="checkbox"/>] • No [<input type="checkbox"/>] • Not applicable [<input type="checkbox"/>] Provide further comment in the free text field
4. Could the manuscript benefit from additional tables or figures, or from improving or removing (some of the) existing ones?	<ul style="list-style-type: none"> • Yes [<input type="checkbox"/>] • No [<input type="checkbox"/>] • Not applicable [<input type="checkbox"/>] Provide further comment in the free text field
5. If applicable, are the interpretation of results and study conclusions supported by the data?	<ul style="list-style-type: none"> • Yes [<input type="checkbox"/>] • No [<input type="checkbox"/>] • Not applicable [<input type="checkbox"/>] Provide further comment in the free text field
6. Have the authors clearly emphasized the strengths of their method/study?	<ul style="list-style-type: none"> • Yes [<input type="checkbox"/>] • No [<input type="checkbox"/>] • Not applicable [<input type="checkbox"/>] Provide further comment in the free text field
7. Have the authors clearly stated the limitations of their method/study?	<ul style="list-style-type: none"> • Yes [<input type="checkbox"/>] • No [<input type="checkbox"/>] • Not applicable [<input type="checkbox"/>] Provide further comment in the free text field
8. Does the manuscript’s structure, flow, or writing need improving (e.g., the addition of subheadings, shortening of text, reorganization of sections, or moving details from one section to another)?	<ul style="list-style-type: none"> • Yes [<input type="checkbox"/>] • No [<input type="checkbox"/>] • Not applicable [<input type="checkbox"/>] Provide further comment in the free text field
9. Could the manuscript benefit from language editing?	<ul style="list-style-type: none"> Yes [<input type="checkbox"/>] No [<input type="checkbox"/>]

[] Not Applicable

[] Beyond my expertise, additional reviewer(s) should be consulted

[] Yes

[] No, the authors should (consider): (please list and number in the text field below your suggestions so that the author/s can more easily follow your instructions or provide rebuttals) (Table 2).

Dissemination recommendations

It is important to inform not only the reviewers but also the authors of the journal about

the implementation of structured peer review and the introduction of the checklist. This can be done by writing an editorial, updating the journal’s guide for authors and reviewers, and indicating this change in the journal evaluation process in relevant letters, such as the reviewer invitation and follow-up letters. Ideally, reviewers should receive the list of questions, clearly stated, as the first two pages of the PDF of the manuscript they are asked to review. Our reviewer interviews showed many reviewers do not take notice of written communications about changes in the evaluation process when presented only through emails or the journal website.

Table 2. Recommended Structured Peer Review Checklist

Manuscript section	Question	Answer	Free text Please list and number your suggestions so that the author(s) can more easily follow your instructions or provide rebuttals
Introduction	Is the background and literature section up to date and appropriate for the topic?	<input type="checkbox"/> Not Applicable <input type="checkbox"/> Beyond my expertise, additional reviewer(s) should be consulted <input type="checkbox"/> Yes, the authors have done a thorough literature review <input type="checkbox"/> No, the authors should (consider)	
	Are the primary (and secondary) objectives clearly stated at the end of the introduction?	<input type="checkbox"/> Not Applicable <input type="checkbox"/> Beyond my expertise, additional reviewer(s) should be consulted <input type="checkbox"/> Yes, the authors have done a thorough literature review <input type="checkbox"/> No, the authors should (consider)	
Methods	Are the study methods (including theory/applicability/modelling) reported in sufficient detail to allow for their replicability or reproducibility?	<input type="checkbox"/> Not Applicable <input type="checkbox"/> Beyond my expertise, additional reviewer(s) should be consulted <input type="checkbox"/> Yes, the authors have done a thorough literature review <input type="checkbox"/> No, the authors should (consider)	
	Are statistical analyses, controls, sampling mechanisms, and statistical reporting (e.g., <i>P</i> -values, CIs, effect sizes) appropriate and well described?	<input type="checkbox"/> Not Applicable <input type="checkbox"/> Beyond my expertise, additional reviewer(s) should be consulted <input type="checkbox"/> Yes, the authors have done a thorough literature review <input type="checkbox"/> No, the authors should (consider)	
Results	Is the presentation of the result, including the number of tables and figures, appropriate to best present the study findings?	<input type="checkbox"/> Not Applicable <input type="checkbox"/> Beyond my expertise, additional reviewer(s) should be consulted <input type="checkbox"/> Yes, the authors have done a thorough literature review <input type="checkbox"/> No, the authors should (consider)	
	Are additional sub-analyses or statistical measures needed (e.g., reporting of CIs, effect sizes, sensitivity analyses)?	<input type="checkbox"/> Not Applicable <input type="checkbox"/> Beyond my expertise, additional reviewer(s) should be consulted <input type="checkbox"/> Yes, the authors have done a thorough literature review <input type="checkbox"/> No, the authors should (consider)	
Discussion	Is the interpretation of results and study conclusions supported by the data and the study design?	<input type="checkbox"/> Not Applicable <input type="checkbox"/> Beyond my expertise, additional reviewer(s) should be consulted <input type="checkbox"/> Yes, the authors have done a thorough literature review <input type="checkbox"/> No, the authors should (consider)	
	Have the authors clearly emphasized the limitations of their study/theory/methods/argument?	<input type="checkbox"/> Not Applicable <input type="checkbox"/> Beyond my expertise, additional reviewer(s) should be consulted <input type="checkbox"/> Yes, the authors have done a thorough literature review <input type="checkbox"/> No, the authors should (consider)	

Most submission systems allow the configuration of a reviewer's questionnaire, allowing for the implementation of the structured peer review checklist. For example, the configured list in Editorial Manager and how it is presented to reviewers and editors are shown in the Elsevier tutorials channel on YouTube.^{8,9} Alternatively, the checklist can be used as a document that could be submitted by email or uploaded in the submission system.

Discussion

We have developed a checklist to facilitate structured peer review, with the aim of improving the completeness and inter-reviewer agreement in peer review. The set of questions in our checklist was designed following the predominant structure of research papers dependent on data gathering or data reuse in biomedical, natural, and social sciences research. It is, therefore, not ideal for non-research articles. The checklist might also be insufficiently specific for some subfields and areas and is not meant to undermine the reporting guidelines checklists developed for specific study types. Previous research has, however, shown that reporting guidelines are rarely used as checklists by reviewers¹⁰ but once used, can improve the thoroughness of their reports.¹¹ We, therefore, encourage journal editors to experiment with this set and adapt it to best capture characteristics most important for the type of studies published in their journals. We encourage editors to test and report their findings so that the scholarly community can learn from such experiments.

While we acknowledge that structured peer review is not going to solve all issues regarding peer review quality and agreement, or entirely stop poorly written review reports, this checklist, when communicated efficiently, can help journals to guide their reviewers through their process and allow for a higher

inter-rater agreement and better coverage of all aspects of the manuscript that editors wish reviewers to check.

We hope that scientific editors and reviewers of journals find this checklist helpful and use it during their evaluation process. We hope authors consider these questions during the drafting and finalization of their manuscripts. We believe this kind of transparency and clear expectations on all sides can help improve the quality of published manuscripts.

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