

Lessons learnt from a scientific peer-review training programme designed to support research capacity and professional development in a global community

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ABSTRACT

High-quality peer-reviewer training open to researchers across the globe has the potential to improve the published literature, however, this type of training is not widely available. In this paper, we describe an online peer-reviewer training programme, highlight its effectiveness in building peer review and writing skills, and discuss challenges and lessons learnt. This training programme, open to researchers across the globe, acquaints participants with challenges to and inequities in publishing and educates them about writing effective peer reviews. A focal point is how to provide specific and respectful feedback to help authors get accepted for peer review at an academic journal. Forty-nine participants from or residing in six continents completed the training. All programme evaluation respondents agreed that the orientation helped them gain a better understanding of their role as a peer reviewer at Pre-Publication Support Service. Most agreed that the training was helpful in improving their peer-review skills, and that the training was helpful in improving their writing skills. Participants wanted more networking and collaboration opportunities with other peer reviewers, inclusion of a qualitatively researched example paper and improved communication about the required time commitment. Our online programme with multiple time options was geographically inclusive but internet connectivity was challenging for some participants. Peer-reviewer training programmes can help researchers build their peer review and writing skills and enhance participants' understanding of disparities in publishing. Integrating a geographically diverse group of researchers has the potential to enrich the discussions and learning in such a programme.

Academic peer review is a foundation on which scientific knowledge is built; peer reviews shape knowledge by optimising manuscript quality and acting as a gatekeeper for publication.¹ Peer review is a key professional skill that helps researchers participate in the academic community, build their professional

SUMMARY BOX

- ⇒ Academic peer review is a foundation on which scientific knowledge is built, however, this type of training is not widely available.
- ⇒ High-quality peer-reviewer training open to researchers across the globe has the potential to improve the published literature. Our paper offers a model for other programmes and points to lessons learnt and considerations for future work.
- ⇒ Given the comprehensive instruction on peer review as well as potential spillover effects of learning writing skills, this peer-reviewer programme could have the potential to strengthen research capacity.

reputations and advance their careers.^{2 3} In addition, giving writing feedback improves the writing skills of a reviewer.^{4 5} In fact, providing feedback to another writer has been shown as more helpful in improving a reviewer's writing skills than receiving and incorporating feedback on one's own writing.^{4 6} Most early-career researchers do not receive formal training on peer review,^{7 8} and this unmet need is particularly relevant for early-stage researchers without available mentorship.^{8 9} These disparities mirror publication disparities across the globe, wherein those with less access to resources and mentors are not as positioned to succeed compared with those with more privilege.^{10 11}

Improving the quality of peer reviews, however, has been an ongoing challenge. Peer-reviewer training programmes have met with limited success in improving the quality and rigour of reviews.^{12–14} The best way to carry out such a training is also unclear.¹⁵

Another challenge in academic publishing is the unprofessional tone and disrespectful way in which some authors are treated by peer

reviewers. Journal reviews with disrespectful language and even personal attacks are not uncommon in the peer-reviewed literature,¹⁶ and authors writing in English as a secondary language may experience this mistreatment more frequently than those for whom English is primary.³ Maintaining a supportive stance in peer review is considered a professional obligation¹⁷ and is more helpful in encouraging writers to productively revise their work compared with disrespectful and/or harsh treatment.¹⁸

PREPSS (Pre-Publication Support Service) is an organisation, which provides manuscript development and writing support to assist authors and address authorship disparities in the published literature.¹⁰ One of the ways PREPSS approaches this goal is by training researchers on how to write a publishable paper.¹⁹ A team of volunteer peer reviewers helps the PREPSS organisation offset its limited funding and staff to support authors in 'getting in the door' at a peer-reviewed journal. PREPSS peer reviewers have experience publishing papers in academic journals, but they do not necessarily have peer-review experience. The peer-review training programme was established to ensure all are equally prepared for the role.

Since its launch in 2017, a major goal of PREPSS has been to increase the diversity of our peer review team in terms of geographical representation. Prior to the COVID-19 pandemic, we held our peer-reviewer training workshops in person at the University of Michigan. During the COVID-19 pandemic, PREPSS converted to virtual training and we realised that this strategy allowed us to improve the geographical diversity of our peer review team. We offered our first virtual training workshop in 2020 and have continued with this format since.

Our peer-reviewer training programme is designed to help reviewers learn to create a peer review that is rigorous, thorough and that motivates a revision that will be accepted for peer review by an academic journal. A major focus of our programme is helping participants (particularly those from the Global North) understand the forces behind disparities in the published literature. We emphasise engaging with a respectful and supportive stance in a global community of scholars.

This Practice paper describes the current efforts PREPSS has undertaken to develop a virtual peer-reviewer training programme with a diverse participant group and

the first steps in evaluating the programme and identifying opportunities for growth. Central questions include the feasibility of developing an online peer-reviewer training programme to fill existing needs, and in what ways the intervention influenced participant confidence in their peer-review skills. We also evaluated participants' self-reported impact on their writing skills. In this Practice paper, we describe the programme, highlight its effectiveness in building peer review and writing skills, and discuss strengths, challenges, and lessons learnt.

WORKSHOP OVERVIEW AND GOALS

The objective of the peer-reviewer training is to acquaint participants with inequities in publishing and educate them about writing effective peer reviews. A focal point is how to provide specific and respectful feedback to help authors get accepted for peer review at an academic journal.

There is no cost to peer reviewers to attend the training programme, but those who complete the training are asked to join the PREPSS volunteer peer review team to review up to two papers over the course of 1 year. Peer reviewers are featured on the PREPSS website, awarded badges for service and are invited to participate in our annual peer-reviewer appreciation week that includes a free scientific communication training. Furthermore, peer reviewers receive access to the other reviews written for the papers they are evaluating as this is a learning opportunity identified in the literature.⁸ Finally, reviewers are notified when the paper they have reviewed is published, providing them an opportunity to see the culmination of their supportive efforts.

Our workshops are designed to be collaborative and highly participatory. [Figure 1](#) provides an overview of the training time frame and activities. After participants complete the peer-reviewer training programme, they are considered 'Provisional' within the PREPSS system. Reviews written by 'graduates' of our training programme are assessed by the PREPSS editor-in-chief for quality and completeness. After a provisional reviewer's initial review is approved as meeting the quality standards laid out in the training, the reviewer moves to active status.



Figure 1 Stages and timing of the Fall 2020 and Spring 2021 PREPSS virtual peer-reviewer training programs. The process consisted of an application period and 1.5-hour orientation (participants could attend synchronously or watch the recording afterward), time for attendees to complete a preworkshop activity on their own and attendance at a 4-hour synchronous virtual workshop (offered at two different times to accommodate various time zones).

PROGRAMME DELIVERY AND LOGISTICS

Applicants to this free online programme are accepted if they meet our criteria of having a minimum educational background of PhD candidate status, being a postdoctoral research fellow in a health-related field, or a medical resident with a research focus, and having first-authored a published paper in a peer-reviewed journal. We do allow for two exceptions to these criteria, as follows. First, we accept participants into the training programme who do not have a first-authored published paper if they have a paper under review at a peer-reviewed journal. These individuals are considered as ‘reserve’ status (they are part of our team, but on hold for reviewing PREPSS papers) until their first-authored paper is published, after which they are moved to ‘provisional’ status. Second, in rare circumstances, participants without the above minimum educational background (eg, someone with a master’s degree but no PhD) are accepted if they have an extensive publication record. Individuals with a terminal degree and at least one first-authored paper in a peer-reviewed journal are not required to complete the training and may join the peer review team with a simple request. These requirements are intended to ensure that authors will be reviewed by researchers with applicable academic and publishing experience. Ella August, a public health faculty member with expertise in writing and health sciences research (and the editor-in-chief of PREPSS), developed the training and led the main training workshop. August also led most of the orientation, however, Anam Khan (PREPSS’s then associate editor) guided orientation participants on how to complete the take home activity. To apply, individuals

completed an online application posted on the PREPSS website, Twitter and University of Michigan newsletters.

The training programme consisted of a 1.5-hour orientation (participants could attend synchronously or watch the recorded orientation afterwards), a ‘take-home’ activity to help participants prepare for the main training workshop, and synchronous attendance at the virtual main training workshop (the components and timing are summarised in [figure 1](#) and topics are highlighted in [table 1](#)).

The orientation covered disparities in global health research, challenges to publishing research, an overview of PREPSS and discussion of training activities. Synchronous attendees participated in Zoom breakout rooms to discuss barriers to publishing. The PREPSS staff created geographically diverse breakout rooms to foster sharing of differing perspectives.

Between the orientation and the main training, participants had 2 weeks to review an early unpublished draft of an example paper (anonymised and shared with the author’s permission) and complete a preliminary assessment of the paper. We identified the target journal for which the paper was written so reviewers could assess how well the paper was tailored to that readership. The assessment comprised five worksheets corresponding to different parts of the manuscript (see online supplemental appendix for worksheets). This assessment did not take the form of a review.

Participants were given approval to attend the final training based on the completeness of their forms. PREPSS editorial staff looked for engagement with the text and thoughtfulness of responses as an indication

Table 1 Description of topics included in the Fall 2020 and Spring 2021 PREPSS virtual peer-reviewer trainings

Orientation length, presentation topics and discussion prompts	Main training session length, presentation topics, discussion prompts and activity description
Length: 1.5 hours long	Length: 4 hours long
Presentation topic: Disparities in global health research (with 6 min breakout discussion)*	Presentation and discussion on writing with a supportive tone Discussion prompt: 6 min breakout discussion about participant experiences with writing feedback and 3 min discussion on respectful and supportive ways to phrase critiques
Presentation topic: Challenges to publishing research	Presentation topic: Giving feedback with clarity and specificity
Discussion prompt: 6-min breakout discussion on most important influence on participants’ writing and their biggest challenge in writing a journal article	Presentation topic: Review of PREPSS peer-reviewer guidelines
Presentation topic: Overview of PREPSS	Collaborative activity: In small breakout teams, translate information from the take-home activity worksheets† into a collaborative peer review for one section of the paper (the introduction, methods, results or discussion).
Presentation topic: Overview of main training session to follow	Collaborative activity: Each team presents their review (eg, of the introduction section) to the larger group and receives feedback on it
*Similar content was covered in 2020 and 2021, but in the 2020 training, we referred to this topic as ‘colonial science’ and in 2021 we referred to it as barriers to publishing research for those in the Global South. Both sessions covered power imbalances in global health, under-representation of authors from the Global South and barriers to publishing for those in the Global South.	
†The activity worksheets are provided in online supplemental appendix.	
PREPSS, Pre-Publication Support Service.	

Table 2 The number of participants who met the eligibility requirements for, attended the orientation and finished the peer-reviewer training programme in the Fall 2020 and Spring 2021 PREPSS peer-reviewer training workshops

Training	Qualified applicants who applied for the programme*	Attended 1.5-hour orientation (either synchronous virtual or asynchronous recorded)	Finished entire three-part training programme, including 4-hour synchronous training workshop	Completed anonymous evaluation
Fall 2020	48	38	33	23
Spring 2021	70	21	16	9
Total	118	59	49	32

Applicants were screened by educational and publication criteria.
*All qualified participants were admitted to the programme.

of future participation in the synchronous training and likelihood of providing valuable feedback to authors. Participants attended the 4-hour main training synchronously, choosing from two time options to accommodate different time zones (the topics are described in [table 1](#)).

In the first part of the main training, the workshop leader (EA) covered writing with clarity and a respectful tone, reviewed PREPSS peer-review guidelines and emphasised leveraging your strengths when writing a peer review, as well as writing across cultures (eg, avoiding idioms). Participants analysed and discussed excerpts from open (ie, publicly available) peer reviews.

In the second part of the main training, participants collaborated with their breakout group to write a review of the example paper based on the analysis in their worksheets and their collaborative discussion. Again, we created diverse breakout rooms, intentionally mixing people from different geographical regions with the understanding that this would improve the quality of their review.²⁰

A link to an anonymous cross-sectional programme evaluation was emailed to participants who completed the programme. The evaluation queried trainee demographics, prior exposure to concepts covered in the training and their assessment of the programme. Short answer spaces were provided for open-ended feedback. Our programme evaluation was reviewed by the University of Michigan Institutional Review Board HUM00192169 and given the status of 'not regulated.'

PROGRAMME PARTICIPANTS

A total of 118 qualified participants applied to the programme (48 and 70 in 2020 and 2021, respectively), and 42% (49/118 across the 2 years) completed the training, including the 1.5-hour orientation, the at-home activity and the 4-hour synchronous virtual workshop ([table 2](#)). Sixty-five per cent (n=23 and n=9 in 2020 and 2021, respectively) of the 49 who finished the training completed an anonymous evaluation. We present combined results across the 2020 and 2021 cohorts here due to the small number of participants and because participants in the two cohorts are not meaningfully different with respect to data we collected.

Just over half (53%; 17/32) of participants who completed the programme and evaluation originated from North America or Europe, a quarter (25%; 8/32) originated from Asia, 19% (6/32) originated from Africa and 1 originated from South America ([table 3](#)). Two-thirds of participants who completed the programme and evaluation (66%; 21/32) resided in North America or Europe.

Most of the 49 participants in our 2020 and 2021 cohorts were advanced students or early-career academics. The majority were doctoral candidates (n=22), 12 were post-doctoral research fellows, 6 were MDs, 6 were PhDs and 3 had master's degrees with extensive publications.

PARTICIPANTS' PEER REVIEW AND PUBLISHING EXPERIENCE

For both cohorts combined, 53% (17/32) of evaluation respondents had not previously/were not sure if they

Table 3 Total eligible applicants (n=118) versus those who completed the programme and postprogramme evaluation (n=32), by continent (nobody resided in or was from Antarctica) in combined 2020 and 2021 training events

Geographical region:	North America	South America	Europe	Africa	Asia	Australia/Oceania
Eligible applicants* (continent of residence)	45	1	25	29	16	2
Completed programme† (continent of origin, continent of residence)	Origin: 11 Residence: 15	Origin: 1 Residence: 0	Origin: 6 Residence: 6	Origin: 6 Residence: 6	Origin: 8 Residence: 4	Origin: 0 Residence: 1

*Data are from the programme application (we did not ask the continent of origin in the application).
†Data are from the postprogramme evaluation.

received peer reviewer training compared with the 47% (n=15/32) who had received training. In terms of writing for a peer-reviewed journal, 91% (29/32) received some training. Meanwhile, 63% (20/32) served as a peer reviewer for an academic journal. Participants reported authoring (in any author position) between 1 and 75 articles (median: 2). Six participants reported having 0 publications in peer-reviewed journals, and this was acceptable for participants at the training stage (participants with a paper under review are accepted to the training programme, remaining as 'reserve' reviewers until their first-authored paper is published).

PROGRAMME EVALUATION

Orientation evaluation

All evaluation respondents agreed that the orientation was helpful in providing them a better understanding of their role as a peer reviewer at PREPSS, and nearly all respondents found the content helpful in gaining insight on peer reviewing and preparing for the main training (table 4). Most respondents valued the opportunity to engage with attendees from diverse geographical locations (table 4). Participants learnt about barriers to publishing in the Global South in both years; in 2020, this was referred to as 'colonial science'. In the postassessment from the earlier training, 57% (13/23) said their understanding of 'colonial science' increased. In 2021, participants' mean understanding of similar content, called 'barriers to publishing in the Global South' was 5.2 and 8.8 before and after the orientation (on a scale of 1–10 where 10 was the highest level of understanding).

Evaluations of the take-home activity worksheets

It took most (67%; 20/30) participants between 1 and 3 hours to review the example paper and complete the worksheets, and the others (33%; 10/30) reported spending four or more hours on this activity. Nearly all participants who responded to the evaluations reported that completing the worksheets prior to the training was useful for structuring their evaluation of the example manuscript (table 4).

Evaluations of the main programme

Over-three quarters of participants (77%; 23/30) agreed that the training was helpful in improving their peer-review skills (table 4). Likewise, 77% (23/30) agreed that the training was helpful in improving their own writing skills. A majority (90%; 26/29) would recommend the workshop to their peers. Participants appreciated learning about comprehensive peer-reviewing skills, the impact of tone on a writer, and the power of providing encouraging comments.

LESSON LEARNT

In this section, we share several lessons learnt, areas for improvement, and considerations for future training. Some participants wanted the opportunity to get to

Table 4 Evaluations of the orientation and main training programme, in 2020 (n=22/30) and 2021 (n=8/30) training events

Evaluation item	Total (n=32)*	2020 (n=23)*	2021 (n=9)*
Orientation and activity			
The orientation was helpful in providing me with a better understanding of my role in supporting authors in low and middle income countries who work with PREPSS.			
Strongly agree	17	13	5
Agree	13	9	3
Somewhat agree	1	1	0
Neutral	0	0	0
Somewhat disagree	0	0	0
Disagree	0	0	0
Strongly disagree	0	0	0
The small group discussion on receiving harsh feedback from a peer review or other mentor was useful in helping me to reflect on the impact tone can have on a writer.			
Strongly agree	14	9	5
Agree	11	10	1
Somewhat agree	4	3	1
Neutral	1	0	1
Somewhat disagree	0	0	0
Disagree	0	0	0
Strongly disagree	0	0	0
The opportunity to have discussions (in small groups and with the larger group) with attendees from different countries and expertise facilitated a broader understanding of the content covered in the orientation			
Strongly agree	15	10	5
Agree	6	5	1
Somewhat agree	3	3	0
Neutral	2	1	1
Somewhat disagree	0	0	0
Disagree	0	0	0
Strongly disagree	0	0	0
Not applicable (watched recording)		4	1
Our discussion of examples of published peer-review excerpts was useful in helping me to construct the peer review I completed in the training.			
Strongly agree	12	8	4
Agree	14	12	2
Somewhat agree	3	2	1
Neutral	0	0	0
Somewhat disagree	1	0	1
Disagree	0	0	0
Strongly disagree	0	0	0

Continued

Table 4 Continued

Evaluation item	Total (n=32)*	2020 (n=23)*	2021 (n=9)*
Completing the worksheets in advance of the formal training workshop was a useful activity for structuring my evaluation of a manuscript.			
Strongly agree	18	13	4
Agree	9	9	0
Somewhat agree	3	0	3
Neutral	0	0	1
Somewhat disagree	0	0	0
Disagree	0	0	0
Strongly disagree	0	0	0
Main training and overall programme evaluation			
This training was helpful in improving my peer-reviewing skills.			
Strongly agree	17	13	4
Agree	6	5	1
Somewhat agree	5	4	1
Neutral	2	0	2
Somewhat disagree	0	0	0
Disagree	0	0	0
Strongly disagree	0	0	0
This training will be helpful in improving my own writing/manuscript development skills.			
Strongly agree	9	6	3
Agree	14	11	3
Somewhat agree	5	3	0
Neutral	2	2	2
Somewhat disagree	0	0	0
Disagree	0	0	0
Strongly disagree	0	0	0
I would recommend this training workshop to my peers.			
Strongly agree	22	18	4
Agree	4	3	1
Somewhat agree	1	0	1
Neutral	2	1	1
Somewhat disagree	0	0	0
Disagree	0	0	0
Strongly disagree	0	0	0
Working with a team to craft the peer-review and having a large group discussion was a useful activity.			
Strongly agree	14	10	4
Agree	9	8	1
Somewhat agree	3	2	1
Neutral	1	0	1
Somewhat disagree	3	2	0
Disagree	0	0	0

Continued

Table 4 Continued

Evaluation item	Total (n=32)*	2020 (n=23)*	2021 (n=9)*
Strongly disagree	0	0	1
I learnt something new after completing this peer-review training.			
Strongly agree			3
Agree			3
Somewhat agree		Yes 19	2
Neutral		No 2	0
Somewhat disagree		Unsure 1	0
Disagree			0
Strongly disagree			0
I plan to use what I learnt in this workshop as a peer-reviewer for PREPSS and as a peer reviewer for scientific journals.			
Strongly agree	23	18	5
Agree	5	3	2
Somewhat agree	1	0	1
Neutral	0	0	0
Somewhat disagree	0	0	0
Disagree	1	1	0
Strongly disagree	0	0	0
*Data for all 32 participants is not reported consistently because some participants did not attend the orientation synchronously, and therefore, certain questions were not applicable to them and also because some respondents did not answer all the questions.			

know other participants beyond their interactions during the 4-hour training. We subsequently initiated a peer-reviewer appreciation week that provides opportunities for volunteers to network. Furthermore, several participants shared that they enjoyed and benefited from collaborating on peer reviews and we subsequently changed our policy to allow for this as an option if the reviewers wish to do so for their post-training peer reviews. Some participants commented that the activity took longer than expected and suggested that we let applicants know about the commitment ahead of time (we implemented this suggestion for the 2021 training).

Internet connectivity was unstable for certain participants, which made some of the group discussions feel frustrating. We recognise now how technology can reduce barriers but also introduce new challenges. Online-only is more geographically inclusive than in-person training, but consideration should still be given for different internet capacities. For example, we could have helped participants with more stable connectivity be more sensitive to this frustration by discussing it at the beginning of the programme and explaining the reasons it might occur (ie, limited resources).

In our training, we included those with a range of publishing and peer-reviewing experience. Teaching

writing skills to a diverse audience is quite challenging,²¹ and this range in experience and skill levels could help explain why some people benefited more from our training and some benefited less. Demographic factors like gender^{10 22} and age²³ have been shown to impact participation and success in academic activities and we will capture such variables in future iterations of our programme evaluation. In addition, though most of our participants were quantitative researchers, others were qualitative researchers and shared a desire to incorporate a qualitatively researched example paper. This is something we plan to add to a future training. In addition, adding a qualitative component to future evaluations of our own programme will add value.

It is also likely that some participants in our programme, perhaps those with less writing experience, learnt something new from completing the worksheets and from creating the collaborative peer review in the main training. Each worksheet contained specific prompts; for example, the introduction worksheet asked reviewers to assess whether the standard introduction arguments were made such as why the research is important (see online supplemental appendix). Reviewers were also asked to consider whether the text was tailored to the target audience and journal.

One novel and important focus of the programme is creating an awareness of the harsh and disrespectful treatment that second-language writers sometimes receive. This type of treatment should be avoided.^{3 16} Participants discussed examples and identified ways in which peer reviewers could be supportive and orient comments toward productive revision. This professional development skill will help reviewers in their future collaborations and even in their teaching, if they choose to pursue it.

Our programming accommodated participants in different time zones. We offered two options for the orientation (synchronous or recorded) and two time options for the main training. This is important for any training seeking to include geographically diverse participants.

Given the comprehensive instruction on peer review as well as potential spillover effects of learning writing skills, this peer-reviewer programme could have the potential to strengthen research capacity, though that was not the primary intention. Research capacity is of particular importance in settings where training on academic discourse is limited.

CONCLUSIONS

We have described a novel online peer-reviewer training programme that included participants from or residing in six continents across the globe. The programme featured education about publication barriers and author disparities, training on peer review, and an opportunity to build community with others.

Peer review is a powerful tool that can build a reviewer's own writing skills^{4 24} and our participants felt their own

writing would benefit from the programme. Peer review is thought to help a reviewer improve their own writing because they can see problems more clearly in another person's work, likely because they are seeing it with fresh eyes.²⁵ Learning to recognise and reflect on different writing problems in another writer's work can translate into detecting them in a person's own writing.^{4 25}

PREPSS is among the organisations^{26–28} committed to supporting authors in publishing their work in academic journals, and we have a policy that prohibits our peer reviewers from participating as authors on the papers they review. PREPSS is a small organisation which partners with and is supported by institutions such as non-profit organisations and universities.²⁹ Individual members of these partnering entities (eg, researchers employed by universities) receive PREPSS services. A future larger funding source would allow PREPSS to achieve its goal of being an open and free resource.

PREPSS is a unique but small organisation striving to serve as a scalable model to build a community of scholars and strengthen capacity across the globe. Our peer-reviewer training programme is innovative with the potential rippling effect of improved writing skills. We hope that others in a variety of geographical settings implement peer-reviewer training programmes to support their own affiliated researchers and to build community with other researchers.

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Competing interests EA is the founder and editor-in-chief of the non-profit organisation PREPSS (Pre-Publication Support Service) and the programme described in the paper is a PREPSS programme. VMD and JMB are PREPSS peer reviewers, though they were not participants in the training programme described in the paper. KLM is employed by PREPSS. YRS and TE are funded by the Center for International Reproductive Health Training (CIRHT) at the University of Michigan and this organisation is one of PREPSS's primary research partners and the funder of this manuscript. Though these are competing interests, it would be impossible to write this paper if we were not affiliated with the organisation.

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REFERENCES

- Patel J. Why training and specialization is needed for peer review: a case study of peer review for randomized controlled trials. *BMC Med* 2014;12:128.
- Allen TW. Peer review guidance: how do you write a good review? *J Am Osteopath Assoc* 2013;113:916–20.
- Ho RC-M, Mak K-K, Tao R, *et al*. Views on the peer review system of biomedical journals: an online survey of academics from high-ranking universities. *BMC Med Res Methodol* 2013;13:74.
- Lundstrom K, Baker W. To give is better than to receive: the benefits of peer review to the reviewer's own writing. *Journal of Second Language Writing* 2009;18:30–43.
- Sucato GS, Holland-Hall C. Reviewing manuscripts: a systematic approach. *J Pediatr Adolesc Gynecol* 2018;31:441–5.
- Nicol D, Thomson A, Breslin C. Rethinking feedback practices in higher education: a peer review perspective. *Assessment & Evaluation in Higher Education* 2014;39:102–22.
- Gewin V. Rookie review. *Nature* 2011;478:275–7.
- Freda MC, Kearney MH, Baggs JG, *et al*. Peer reviewer training and editor support: results from an international survey of nursing peer reviewers. *J Prof Nurs* 2009;25:101–8.
- Rodríguez-Carrio J, Putrik P, Gwinnutt J, *et al*. Mentoring for postdoctoral researchers in rheumatology: the emerging EULAR network (EMEUNET) post-doc mentoring programme. *RMD Open* 2020;6:e001139.
- Busse CE, Anderson EW, Endale T, *et al*. Strengthening research capacity: a systematic review of manuscript writing and publishing interventions for researchers in low-income and middle-income countries. *BMJ Glob Health* 2022;7:e008059.
- Mbaye R, Gebeyehu R, Hossmann S, *et al*. Who is telling the story? A systematic review of authorship for infectious disease research conducted in Africa, 1980–2016. *BMJ Glob Health* 2019;4:e001855.
- Bruce R, Chauvin A, Trinquart L, *et al*. Impact of interventions to improve the quality of peer review of biomedical journals: a systematic review and meta-analysis. *BMC Med* 2016;14:85.
- Schroter S, Black N, Evans S, *et al*. Effects of training on quality of peer review: randomised controlled trial. *BMJ* 2004;328:673.
- Schroter S, Black N, Evans S, *et al*. What errors do peer reviewers detect, and does training improve their ability to detect them? *J R Soc Med* 2008;101:507–14.
- Köhler T, González-Morales MG, Banks GC, *et al*. Supporting robust, rigorous, and reliable reviewing as the cornerstone of our profession: introducing a competency framework for peer review. *Ind Organ Psychol* 2020;13:1–27.
- Silbiger NJ, Stubler AD. Unprofessional peer reviews disproportionately harm underrepresented groups in STEM. *PeerJ* 2019;7:e8247.
- COPE. Creating a culture of publication integrity together. 2023. Available: <https://publicationethics.org> [Accessed 8 Feb 2023].
- Zawacki TM, Cox M. *WAC and second-language writers: research towards linguistically and culturally inclusive programs and practices*. Anderson, South Carolina: Parlor Press, 2014.
- Busse C, August E. How to write and publish a research paper for a peer-reviewed Journal. *J Cancer Educ* 2021;36:909–13.
- Phillips KW. How diversity makes us smarter. *Sci Am* 2014;311:43–7.
- Roed D, Pantoja V, Yena L, *et al*. *Strategies for teaching first-year composition*. 1111 W. Kenyon Road, Urbana, IL: National Council of Teachers of English, 2002: 61801–1096.
- Laupland KB, Edwards F, Dhanani J. Determinants of research productivity during postgraduate medical education: a structured review. *BMC Med Educ* 2021;21:567.
- Obuku EA, Lavis JN, Kinengyere A, *et al*. Academic research productivity of post-graduate students at Makerere University College of health sciences, Uganda, from 1996 to 2010: a retrospective review. *Health Res Policy Syst* 2017;15:30.
- Janke KK, Bzowycykj AS, Traynor AP. Editors' perspectives on enhancing manuscript quality and editorial decisions through peer review and reviewer development. *Am J Pharm Educ* 2017;81:73.
- Bean JC, Chappell VA, Gillam AM. *Reading rhetorically. 4th Edition*. New York: Pearson, 2014.
- HarvardQSS. Peer pre-review. 2023. Available: <https://socialscience.one/peer-pre-review> [Accessed 8 Feb 2023].
- TCCAfrica. About. 2023. Available: <https://www.tcc-africa.org/about> [Accessed 8 Feb 2023].
- AuthorAID. Home. 2023. Available: <https://www.authoraid.info/en> [Accessed 8 Feb 2023].
- Pre-Publication Support Service (PREPSS). Available: <https://P> [Accessed 1 Jan 2023].

PREPSS Peer Reviewer Training Activity*

Instructions: Review the example paper and then complete the five worksheets with your analyses. Completing the worksheets will help you prepare for the collaborative peer review activity during which you will work with other training participants to write a mock review for the author of the example paper.

* Minor adjustments and clarifications were made to these worksheets for the purposes of this publication.

WORKSHEET 1: Introduction Peer Review Guide Worksheet

Please begin this worksheet after you have read the entire paper once through from beginning to end. Proceed with the worksheet by substantively responding to the below prompts.

1) Review the below graphic, which outlines the arguments that are typically made in the introduction section of original research papers.

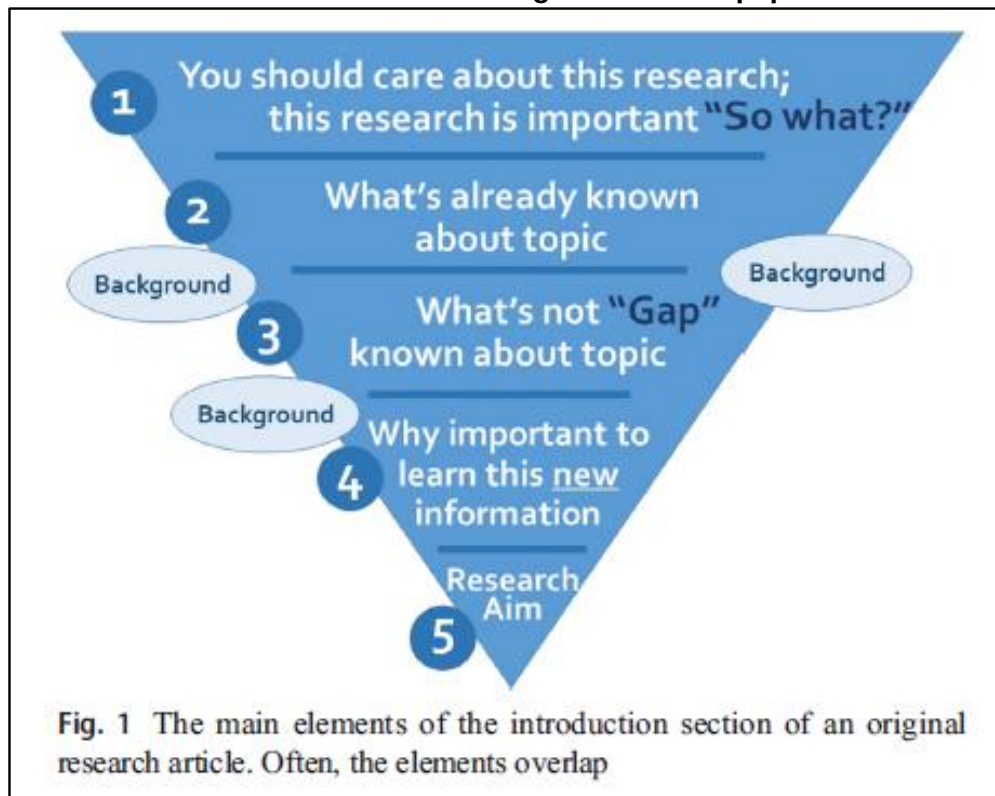


Figure from: Busse C, August E. How to Write and Publish a Research Paper for a Peer-Reviewed Journal. *Journal of Cancer Education*. <https://doi.org/10.1007/s13187-020-01751-z>

2) Comment on the introduction section by completing the below table.

Introduction element	Comment on whether the author included this element; if so, was it clear, convincing and well supported?
You should care about this research; this research is important (“so what”)	
What is already known about topic	
What is not known about topic	
Why is it important to learn this new information	
Justification of doing research in specific population or location (if applicable)	
Research question / objective/ aim/ hypothesis	
Additional elements	
Does the introduction provide enough background to help the audience (core readership of the target journal?) understand the paper?	
Are statements appropriately cited?	
Does the introduction address information relevant to the research question? For example, if the paper aims to evaluate effect modification of a particular relationship, has that been adequately set up/justified in the introduction?	
Is the introduction well organized?	
Are there too many abbreviations to keep track of?	

Is the length appropriate? Most introductions are between 3-6 paragraphs long.	
Additional comments	

WORKSHEET 2: Methods Peer Review Guide Worksheet

Please begin this worksheet after you have read the entire paper after completing worksheet 1. Proceed with the worksheet by substantively responding to the below prompts.

1) Note the research question / aim/ objective from the example paper below.

Research question/ aim/ objectives / hypothesis	
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2) Comment on the methods section by completing the below table. NOTE: The below criteria are based on “Strengthening the Reporting of Observational Studies” (STROBE) guidelines (<http://www.equator-network.org/>) as this is an observational study.

Methods element	For each element, comment on how well it is described and justified with explanatory text and references
Setting	
Population	
Study design	
Recruitment	
Sample and sample size	
Data <ul style="list-style-type: none"> • How data were collected (questionnaire, chart review, etc.)? • Variables: how defined and measured? • Variables: identify the outcome, the exposures and covariates; identify which are potential confounders and effect modifiers • Justify methods of measurement (e.g. provide citation showing that your 	

<p>questionnaire is valid in your study population)</p> <ul style="list-style-type: none"> • Describe efforts to address potential sources of bias 	
Laboratory analyses	
<p>Statistical analyses</p> <ul style="list-style-type: none"> • Describe statistical methods, and connect them to research question/ aim • Describe and justify statistical approaches for confounding, identify effect modification, describe stratified analysis • Explain how missing data were handled • <i>Cohort study</i>—If applicable, explain how loss to follow-up was addressed • <i>Case-control study</i>—If applicable, explain how matching of cases and controls was addressed • <i>Cross-sectional study</i>—If applicable, describe analytical methods taking account of sampling strategy • Describe any sensitivity analyses 	
Ethical approval (is it confirmed in the paper?)	
Additional elements	
Is the information presented in a logical order?	
Have the authors 1) described , 2) justified , and 3) cited each method?	
Have the authors clearly connected the statistical analysis with their research question/ aim rather than providing a generic description of analysis that doesn't feel connected?	
Are the methods for EVERY result described?	
Is there enough information to permit replication?	
Methods tables and figures	

<p>Comment separately on each figure or table (only those that appear in the methods)</p> <ul style="list-style-type: none">• Is the message clear?• Does the table/figure stand on its own (the reader can understand it without referring to the text)?• Is the N consistent with methods/ other results?• Is the title or legend clear?• Is color and/or shading used effectively?	
Additional comments	

WORKSHEET 3: Results Peer Review Guide Worksheet

Please begin this worksheet after you have read the entire paper after completing worksheets 1-2. Proceed with the worksheet by substantively responding to the below prompts.

1) Note the research question / aim/ objective from the example paper below.

Research question/ aim/ objectives / hypothesis	
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2) Comment on the results section by completing the below table.

Tables	Comment here
For each results table: <ul style="list-style-type: none"> ● Is the message clear? ● Does the table/figure stand on its own (the reader can understand it without referring to the text)? ● Is the N consistent with methods/ other results? ● Is the title clear? ● Is color and/or shading used effectively? ● If applicable, is it clear what statistical tests were performed? ● Are footnotes included where necessary (e.g., for abbreviations) and are they clear? ● Other comments? 	
Figures	Comment here
For each results figure: <ul style="list-style-type: none"> ● Is the message clear? 	

<ul style="list-style-type: none"> • Does the table/figure stand on its own (the reader can understand it without referring to the text)? • Is the N consistent with methods/ other results? • Is the legend clear? • Is color and/or shading used effectively? • If applicable, is it clear what statistical tests were performed? • Are footnotes included where necessary (e.g., for abbreviations) and are they clear? • Other comments? 	
Text	Comment here
Are figures and tables each described adequately in the text? Are figures and tables described in the appropriate order?	
Does the results text repeat rather than highlight information in the tables and figures?	
Do the results include data addressing all research aims posed in the introduction?	
Are the results described “directionally” (e.g. as X increased, y decreased rather than x was significantly related to y)?	
Are the results presented appropriately given the study design (e.g. do the authors avoid inappropriate causal language)?	
Are results organized logically? Are sub-sections used or necessary?	
Are methods or discussion points inappropriately included in this section?	
Additional comments	

WORKSHEET 4: Discussion Peer Review Guide Worksheet

Please begin this worksheet after you have read the entire paper after completing worksheets 1-3. Proceed with the worksheet by substantively responding to the below prompts.

1) Review the below list of elements that can be included in the discussion section of original research papers.

Discussion Section Elements

- **Mini synopsis (optional)**
- **Recap main findings**
- **Discuss significance of results and interpret meaning**
- **Do results agree with other research? Why or why not?**
- **Biological / social / mechanistic/ other pathways that might explain results**
- **Strengths of study**
- **Limitations of study**
- **Impact and applications of research**
- **Suggestions for future work**

2) Note the research question / aim/ objective from the example paper below.

Research question/ aim/ objectives / hypothesis	
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3) Comment on the discussion section by responding to the below prompts.

Discussion element	Comment on whether the author included this element; if so, was it clear, convincing and well supported?
Recap main findings	

Discuss significance of results and interpret meaning	
Do results agree with other research? Why or why not?	
Describe biological, mechanistic, social (or other) pathways that might explain results	
Strengths of study	
Limitations of study	
Impact and applications of research	
Suggestions for future work	
Additional elements	
Is the discussion well organized?	
Are statements appropriately cited?	
Clarity and appropriateness of discussion points including directionality, presentation of values, and causal language.	
Additional comments	

WORKSHEET 5: Abstract and Title Peer Review Guide

Worksheet (complete this worksheet last)

Please begin this worksheet after you have completed worksheets 1-4. Proceed with the worksheet by substantively responding to the below prompts.

1) Note the research question / aim/ objective from the example paper below.

Research question/ aim/ objectives / hypothesis	
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2) Comment on the abstract section by completing the below table.

Abstract element	Comment on whether the author included this element; if so, was it clear, convincing and well supported?
Background: Context, importance, brief definitions or background (enough to help the reader understand the rest of the abstract)	
Background: Research aim or question	
Methods: How study was done	
Results: Highlight main findings	
Conclusions: Summarize what the study contributes and applications	
Additional elements	
Can you get a sense of the paper's main message from reading the abstract?	
Does the abstract inappropriately include details	

like the software type and version that would more appropriately be placed in the main paper?	
Additional comments	

3) Comment on the title by completing the below table.

Title element <i>NOTE: Every study is different and title styles vary. Every element below does not need to be included in the title. The prompts are for your consideration, and we will discuss this topic more in the main training session.</i>	Comment on whether the author included this element; if so, was it clear, convincing and well supported?
Is the title an invitation to read further? Is it interesting?	
Does the title give you a sense of what the study is about?	
Are the dependent and independent variables included?	
Is the study design apparent from the title?	
The timing of the study (e.g. if it was a prospective study, did it take place over 2 months or 2 decades?)	
Population and setting?	
The main study finding?	
Does the title inappropriately use abbreviations?	
Does the title mention the name of a specific hospital or region that may not be familiar to the readers of the	

journal?	
Do the keywords repeat any title words?	
Other comments on the title?	