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Towards the enhancement of quality publication practices in
clinical psychological science

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Abstract

Addressing the ‘replication crisis’ and questionable research practices are at the forefront of international research agendas in clinical psychological science. The aim of this paper is to consider how the quality of research practices can be improved by a specific focus on publication practices. Currently, the responsibility for documenting quality research practices is primarily placed on authors. However, barriers to improved quality publication practices cut across all levels of the research community and require a broader approach that shares the burden for ensuring the production of high quality publications. We describe a framework that is intended to be ambitious and aspirational and encourage discussion and adoption of strategies to improve quality publication practices (QPPs). The framework cuts across multiple stakeholders and is designed to enhance (a) the quality of reporting; (b) adherence to protocols and guidelines; (c) timely accessibility of study materials and data. We discuss how QPPs might be improved by (a) funding bodies considering formally supporting QPPs; (b) research institutions encouraging a research culture that espouses quality research practices, and internally supporting QPP review processes and professional development in QPPs; (c) journals expanding editorial teams to include reviewers with design and statistical expertise, considering strategies to enhance QPP adherence during the peer review process, and committing to ongoing assessment and development of QPP training for peer reviewers; and (d) authors and peer reviewers integrating QPPs during the manuscript preparation/peer review process, engaging in ongoing QPP training, and committing to openness and transparency initiatives. We discuss the current state and potential next steps within each stage of the framework and provide information and resources to enhance QPPs. We hope that the suggestions offered here inspire research institutions, leaders and faculty to discuss, reflect on, and take action towards, integrating these, or other, QPPs into their research practice and workplace.

Keywords: quality research practices; reproducibility; publication process

The “replication crisis in psychology” stems primarily from widely publicized replication failures, the prevalence of questionable research practices (QRPs), and sporadic (but nevertheless highly concerning) reports of data fabrication and falsification (see Tackett et al., 2017 for a review). The crisis has received a great deal of attention both within the psychological science community as well as in the popular press (e.g., Ioannidis, 2005; John, Loewenstein & Prelec, 2012; Nosek et al., 2015; Open Science Collaboration, 2015; Tackett et al., 2017). Despite the fact that this crisis primarily stemmed from failures to replicate in social and cognitive psychology (e.g., Donnellan, Lucas, & Cesario, 2015; Klein, 2014; Open Science Collaboration, 2015), Tackett and colleagues (2017) recently argued that the issue is also of great relevance to clinical psychological science and highlighted the need to call into question critical aspects of the research process, including how studies are designed, how results are generated and reported, and how journals evaluate what makes an article of scientific value.

Despite the many challenges facing the field, notable strides have been made in developing and implementing strategies to improve the quality of research practices in clinical psychological science. Examples include an emphasis on pre-registration of the rationale, design, measures, analytical plan and primary outcomes of studies (e.g., clinicaltrials.gov; anzctr.org.au), the publication of study protocols including potential moderators for secondary analyses (Tackett et al., 2017), making data available in open repositories (www.osf.io), encouraging cross-site collaborations to ensure adequate power and sample size (e.g., Abend et al., 2018; Hudson et al., 2015), and encouraging the development and use of design and measurement standards across laboratories (e.g., Blumenthal et al., 2005; Boucsien et al., 2012; Ryan, Zimmer-Gembeck, Neumann, & Waters, 2019). As illustrated in Figure 1, most of these strategies target stages of the research process focusing on Research Design and Planning to Data Analysis.

A focus on enhancing quality publication practices

Surprisingly, far fewer strategies have been proposed that target the Manuscript Preparation to Publication stages of the research process (see Figure 1), even though the long-standing model of journal editorial management and independent peer review serves as the gate-keeper of high quality and timely publication practices. Yet alarmingly, poor quality reporting practices (e.g., publications that do not report key elements of experimental design), withholding details from publication (or only vaguely reporting them), and common clerical and administrative errors are likely to play contributory roles to the irreproducibility of research findings and contribute to ‘research waste’ (Begley & Ioannidis, 2015; see Collins & Tabak, 2014; Cristea & Naudet, this issue). Moreover, the few strategies that have been proposed to enhance this stage of the research lifecycle have primarily centred on author-focused initiatives, such as encouraging the documentation of compliance with quality research practices through the use of guidelines and checklists (e.g., CONSORT & PRISMA guidelines and journal-specific checklists; Appelbaum et al., 2018), or journal-focused initiatives, such as requiring author compliance with open science practices e.g., open data, open materials and pre-registration, mandating the submission of manuscript reporting checklists at the time of submission (e.g., CONSORT & PRISMA), and recognizing authors for implementing open science initiatives (<https://www.psychologicalscience.org/publications/badges>) (Shrout & Rogers, 2018).

Insert Figure 1

Although well-intended, these initiatives entail a number of constraints. For example, they rely on the implementation of high-quality research practices earlier in the research lifecycle (e.g., pre-registration), and they primarily place the responsibility for documenting these practices with the author, yet they do not provide a clear mechanism for the confirmation of these practices and the accuracy of reporting. For authors, completing potentially lengthy research practice adherence documentation could delay manuscript preparation time which may be further compounded by funding and workload constraints,

and might encourage authors to seek journal outlets that do not stipulate such stringent submission guidelines due to considerable pressure upon authors' to 'publish or perish' (Begley & Ioannidis, 2015). Furthermore, placing the onus of confirming quality reporting on the author may not overcome problems associated with reporting bias (Collins & Tabak, 2014).

The challenges to implementing existing initiatives aimed at improving quality research practices highlight broader underlying barriers to improving research practices faced by the field of clinical psychological science. These include a serious lack of funding to support quality publication practices, constraints on author, editorial and reviewer time and expertise, pressure to reduce time-to-publication and enhance accessibility, and an academic culture that values and rewards individual achievement, novelty/innovation, and quantity of academic outputs at the decrement of quality publication practices and outputs (MacLeod et al., 2014). Therefore, rather than placing the burden of responsibility for documenting quality research practices primarily with the author, expanded approaches are needed that address these broader underlying barriers that cut across all stakeholders in the research lifecycle, and seek to address how the burden to improve the uptake of strategies aimed at improving high quality research practices can be shared across the research community.

A conceptual framework for enhancing quality publication practices

The goal of this paper is to provide a conceptual framework for enhancing quality publication practices (QPPs) as part of a broader set of initiatives to improve research practices and replication of findings within the field of clinical psychological science (for examples, see Dunn et al., Hildebrandt et al., and Cristea et al., this issue). We propose a conceptual framework that is intentionally ambitious and aspirational and is aimed at inspiring those in the field of clinical psychological science to discuss, reflect on, and take action towards integrating QPPs into their research practice and workplace (including

research institutions, journals, and funding bodies). The framework considers journal, author and peer review processes, as well as broader contextual influences, including the role of research institutions and funding bodies, that could significantly impact and improve this stage of the research lifecycle.

The primary goal of this framework is to *enhance the quality of published manuscripts in which the methods, procedures and results are clear, accurate and accessible*.

The framework focuses on enhancing three manuscript quality parameters: the *quality* of reporting, *adherence* to study protocols and analytical guidelines, and the degree of *accessibility* of study measures, materials, and data within a timely manner. A secondary aim is to propose a framework that is not just conceptually useful in terms of delineating goals that we are aspiring to, but is also tangibly useful by suggesting methods for moving towards these goals despite the numerous barriers. Thus, we incorporate information about manuscript preparation, peer review resources and open science practices (Tables 1-4; Appendix C of supplementary materials), manuscript quality checklists tailored to clinical psychological science studies for use by authors and reviewers (Appendix B of supplementary materials), and a template protocol adherence and manuscript quality assessment checklist for use/adaptation by research institutions (Appendix A of supplementary materials) that might assist in taking steps towards implementing an internal QPP review framework. At each stage of the framework, we discuss the current state of the field and potential steps to address the related barriers. Our goal in each of these sections is to provide a “menu” from which stakeholders can choose and adapt.

Overview of the QPP Framework. We consider improvement of QPPs as one part of the larger research lifecycle in which enhancing quality research practices must be addressed at each stage (see Figure 1). Responsibility for this improvement rests with the entire research community, from funding bodies and research institutions to authors, journal editorial teams, and peer reviewers. Moreover, any framework aimed at improving QPPs

must address: (a) the importance of both scientific innovation and replication; (b) the need to implement new policies and procedures that minimise additional burden on editorial teams, reviewers and authors; (c) the diversity in research scope and author stage of career; and (d) the importance of improving QPPs in the short- and long-term.

As illustrated in Figure 2, the proposed framework emphasises a multi-level approach to improving manuscript quality. At a contextual level (Panel A), a commitment from granting bodies and research institutions to fund protocol adherence and quality reporting assessments prior to manuscript submission would assist in overcoming some of the barriers associated with the burden of responsibility for checking quality parameters. Similarly, the capacity for research institutions (Panel B) to espouse a research culture that emphasises the importance of quality research practices, implement formal manuscript quality review and protocol adherence processes, and commit to ongoing training of research personnel in QPPs would distribute the burden currently carried by authors, journal editorial teams and peer reviewers and enhance sustainability of QPPs over time. At the journal level (Panel C), refinements to the organisation of editorial boards and peer reviewers in terms of primary reviewing roles targeting QPPs, submission of manuscripts after institutional review, revised peer review practices to draw closer attention to reporting quality, protocol and statistical adherence, and reduced time to publication, as well as a commitment to the ongoing development of effective training and accreditation of the peer-review workforce in QPPs are also proposed to contribute to enhanced research practices and greater capacity to replicate studies over time. Similarly, at the author submission stage (Panel D), submission of manuscript quality assessment checklists, copies of completed reporting guidelines (e.g., CONSORT, PRISMA, journal-specific) and conflict of interest and funding statements, as well as peer review by panels with dedicated QPP roles (Panel E) supported by continued engagement in open science initiatives and training, would provide a second independent mechanism for ensuring the publication of clear, accurate, and accessible research. In the

sections that follow, we discuss the current state of the field and offer potential next steps to address them at each stage of the framework.

Strategies to enhance QPPs at the funding level

Current state. In many national funding bodies, grant application requests for funding to publish protocol papers, or additional personnel support to oversee manuscript quality and evaluate protocol adherence, are not supported as dedicated budget items (LeVeque et al., 2012). Furthermore, open-access journals that authors often use to publish protocol papers typically incur substantial publication fees. These funding barriers contribute to the challenges authors face in being able to conduct thorough reviews of protocol adherence and manuscript quality.

Potential next steps. A general recommendation that would help circumvent these difficulties is for *funding bodies to formally fund QPPs*. To ensure this is an open process that becomes an authentic part of the research lifecycle, funding bodies could consider *dedicating a section to QPPs in grant applications and budget requests*. Additionally, *authors may be requested to outline how funds will be utilized in their* application. This might include the publication costs of open access journals or those that report protocol papers, and dedicated personnel and resources required to conduct reviews of manuscripts for QPPs prior to journal submission. Authors might then report on how they are engaging in QPPs during regular annual reports to funding agencies.

Strategies to enhance QPPs through increased research institution support

Current state. Although we do not focus on it directly here, the broader incentive structure that often rewards novel and innovative research over rigor and replication and drives the desperation to ‘publish or perish’ is a multifaceted, multistakeholder problem that affects individual clinical psychological scientists and research institutions alike (Begley & Ioannidis, 2015; see Dunn et al., this issue). In such a climate, a research culture of competition, individual achievement, innovation over replication, and quantity over quality

may be both explicitly and implicitly promoted (Begley & Ioannidis, 2015; LeVeque et al., 2012; MacLeod et al., 2014). As such, there may be very little focus on research quality practices within research institutions, including specific goals and procedures to assist researchers in undertaking manuscript quality reviews and protocol adherence checks. In most cases, in the absence of ongoing grant funding, this may be left to individual researchers to absorb into their workloads prior to journal submission, often atop heavy teaching, supervision and service roles which together may encourage short-cuts, errors, and poor QPPs and outputs (Collins & Tabak, 2014; MacLeod et al., 2014; see <http://retractionwatch.com/>). Indeed, the longer a researcher is required to devote to QPPs, the longer the lag time is likely to be until journal submission, which in turn, is in direct competition to the ‘publish or perish’ culture espoused within many research institutions (Begley & Ioannidis, 2015).

Potential next steps. Without concerted effort and broad agreement on goals and procedures for enhancing QPPs, all stakeholders in the research lifecycle face considerable challenges and disincentives for implementing practices to enhance reproducible research (LeVeque et al., 2012). Therefore, the broad recommendation here is that research institutions tackle these barriers by *promoting a research culture that strongly advocates for quality research practices* such as QPPs, alongside the quantity and novelty of clinical psychological research. Changing research culture is not an easy task but an important goal to be strived towards (Nosek et al, 2015). This requires engagement from institutional research leaders to develop policies and practices that represent a set of broadly shared and strongly held values and cut across all levels of the research institution (LeVeque et al., 2012; Nosek et al., 2015).

Within such a context, the implementation of independent manuscript review processes within research institutions may assist in enhancing quality research practices. One such way this might be achieved is through the implementation of *QPP review committees* within departments/schools/centres/research offices to conduct manuscript evaluations for

their research personnel prior to journal submission. These committees might implement formal checklists, such as the example Protocol Adherence and Manuscript Quality Assessment Checklist (see Appendix A of supplementary material), which tracks the QPP review process and includes authorization from an appointed QPP committee member to submit with the manuscript. After an initial manuscript review, authors might revise and resubmit the manuscript for further checking by the committee and inclusion with the manuscript at the time of submission.

In terms of funding and sustainability, if QPPs were built-in to grant funding structures, these committees may, in part, be funded on a fee-for-service basis, thereby overcoming potential concerns about funding and sustainability. Financial support from research institutions for personnel support would also be important. Moreover, in the interest of training future generations of research scholars in QPPs, and bearing in mind that many PhD scholars complete their training without receiving formal training in manuscript preparation and peer review processes, integrating *research internships within QPP review committees* as part of PhD training programs would provide valuable training opportunities as well as supplement the capacity of the committee to undertake QPP reviews. It might be said that such institution-level QPPs would lengthen time-to-publication and accessibility. However, these internal review processes have the potential to reduce the burden on authors and peer reviewers to complete lengthy checklists prior to, or during, manuscript submission. These internal reviews of protocol adherence and reporting quality might also reduce the extent of feedback raised by reviewers, and thus, the likelihood of rejection or a lengthy revise and resubmit process.

Another key step is *providing early career scientists with practical information about the peer review process* (such as the resources available in Table 1 and the flow diagram provided in Appendix C of the supplementary material). *Mentoring of early career scientists* on matters of scientific rigour and transparency during manuscript preparation is inconsistent

at best and provides another opportunity for long-term implementation of QPPs (Nature News, 2013). Specific strategies might include integrating formal training in QPPs into graduate psychology programs (particularly if this mandated by accreditation bodies for psychology graduate research programs), providing opportunities for supervisor-student peer-reviews and offering dedicated courses in quality research practices, open science initiatives, and peer-review processes. Similarly, institutional commitment to ongoing professional development and education of research faculty in open science initiatives and QPPs may additionally contribute to enhanced publication and peer review practices in the short- and long-term. A commitment by institutional leaders to advocate for research personnel to submit to, and review for, journals that support reproducible research and QPPs and to consider reproducibility and rigor in hiring and promotion might also assist in cultivating a research culture within the broader research community that QPPs are important to support in all stages of the research lifecycle. Providing institution-level incentives for adhering to quality research practices such as QPPs should also be considered (e.g., annual quality research practices awards). The formation of an advisory group on QPPs in clinical psychological science that cuts across research institutions and oversees the organization of workshops and meetings to ensure the field keeps up-to-date with advances in open science practices, and to develop QPP resources for use by the broader research community, would be an important step towards implementing change in the short- and long-term.

Insert Table 1

Strategies to enhance QPPs via journal editorial processes

Current state. The editorial and peer review process provides a further opportunity in the research lifecycle to consider how QPPs can be strengthened. Most journals apply similar submission procedures involving screening and assigning manuscripts to action editors who in turn seek reviews from two or more researchers with expertise in the field. Some journals

have editorial assistants screen papers for compliance with journal standards (e.g., abstract word length and structure) prior to assignment to an action editor. Once assigned, reviewers are sourced from editorial boards, key authors cited in manuscript reference lists, journal search engines, and the action editor's knowledge of experts in the field. Securing suitable reviewers can be a major barrier at the journal submission stage and it may take considerable time if some researchers decline review invitations or require a lengthy turnaround time to submit reports (Moher & Jadad, 2003). Ultimately, the final combination of reviewers may be quite diverse in career stage and expertise in the field of research, study design, and methodology. There are generally very few incentives for researchers to dedicate time and expertise to the review process. Peer review is therefore often undertaken out of good will and a sense of commitment to the discipline, journal and/or editor and this lack of time and incentive to review can contribute significantly to the lag in time to publication (Kelly, Sadeghieh, & Adeli, 2014).

Potential next steps. Quality publication processes are likely to improve over time by journals adopting QPP policies and procedures. This broadly includes the implementation of open science practices within the manuscript publication process to encourage access to protocols, materials and data (see Table 2) (see Morey et al., 2016). However, this does not relate to processes to enhance the quality of reporting which primarily rests with the author prior to submission given that journal editorial personnel, editors, and peer reviewers typically do not have the time or resources to conduct manuscript quality adherence reviews. One consideration is whether the formation of journal manuscript quality review boards, in addition to the full editorial board, might assist in enhancing the quality of reporting. These review boards may be tasked with conducting quality adherence checks to ensure papers have all the basic requirements sufficiently addressed in relation to quality reporting, accuracy and accessibility before they are sent out for full review. These review boards may serve as a valuable training step in the peer review process prior to full editorial board membership, and

for participating researchers, membership may represent an important esteem indicator in relation to track record and career development.

An alternative model to quality review boards is the formation of *manuscript review panels* whereby each reviewer assigned to a manuscript might be asked to provide their general comments about the overall quality of the paper and additionally completes one of three specific QPP roles i.e., reviews either: (a) the quality of reporting against standard guidelines (e.g., CONSORT, journal-specific) (see Appendix B of supplementary material); (b) adherence to project protocols (e.g., preregistration, published protocols or statistical guidelines) (see Appendix A of supplementary material); or (c) accessibility of materials, measures and data (see Table 2). This division of quality review activities within each panel might enhance attention to specific details of studies and improve QPPs overall, particularly for submissions from research institutions that are unable to implement internal strategies to support QPPs for their research faculty. Of course, any perception that changes to the peer review process might make the work of peer reviewers even slightly more complicated might negatively impact upon willingness to review (Moher & Jadad, 2003). Developing an implementation plan, clear communication strategies and availability of resources and review examples would be important and may be enhanced by providing training to the editorial board and inviting peer reviewers to undertake online training during the implementation timeframe.

Insert Table 2

Although open peer review (i.e., where reviewers are known to authors) remains controversial (see section below on open peer reviewing), very little is currently known about whether QPPs might be enhanced following *open panel review* (where reviewers are known to each other) and findings have been mixed (Bruce et al., 2016; Walsh et al., 2000). On one hand, this may be beneficial in terms of enhancing reviewer commitment and providing an opportunity for consultation. On the other hand, it may be an opportunity for some reviewers

to attempt to persuade other reviewers with strongly held views about the paper. Limiting openness between reviewers to sharing information about primary QPP review roles, rather than their general review of the paper, may address these concerns and warrants further consideration.

Another important consideration at the journal level is ongoing professional development of authors and peer reviewers in relation to QPPs. As the focus on questionable research practices, the replication of findings, and strategies to improve them has expanded rapidly in recent years (Nosek et al., 2015; Tackett et al., 2017), keeping the peer review workforce up-to-date on these developments will likely increase QPPs over time. Therefore, it may be valuable for journals and editorial teams to consider introducing online peer review training modules in open science, quality peer review processes, and journal-specific practices. The inclusion of formal certification of engagement in ongoing peer review training may also increase researchers' commitment to QPPs as authors and peer reviewers and provide an incentive to engage in training and high quality peer review practices over time. Furthermore, to ensure continuity of QPPs over time, the inclusion of early career scholars in the peer review process is important, and may be integrated via journal editorial board structures, such as associate editorial boards (e.g., <https://www.journals.elsevier.com/behaviour-research-and-therapy>) and manuscript quality review boards (see suggestion above).

Finally, researchers are currently rewarded for highly innovative and novel research, the number of publications produced, and other academic achievements that accentuate the value placed on innovation, with less value attributed to efforts related to replication and reproducibility (MacLeod et al., 2014) (for further discussion of the tension between innovation and replication in clinical psychological science, see Dunn et al., this issue). Therefore, a commitment from journals to publishing regular issues devoted to replication research, including study protocols and subsequent publication of findings regardless of

outcomes (e.g., registered reports) may also assist in increasing the value placed on replication trials, methodological rigor, and QPPs over time. Similarly, special issues (similar to the present one), where *journals devote space to discussing research quality issues and generating feasible solutions* is another way that journals can help raise awareness of the importance of QPPs.

Implementing journal openness procedures, such as the opportunity for *authors and peer reviewers to sign-up and endorse QPPs on journal websites* may also cultivate broadly shared values regarding quality research practices (see <https://opennessinitiative.org/>). Initiatives such as these may also suggest the need for increasingly *specialized members of editorial boards*, particularly in relation to statistical methods and research design (as discussed in Hildebrandt & Prenoveau, this issue), and having sufficiently *large editorial teams* comprising of editors, reviewers and editorial administration personnel.

To that end, given that peer review practices are not formally recognized in academic workloads and duties, an important consideration for the success of any new initiatives to enhance manuscript quality practices at the journal level requires formally *recognizing the time and workload commitments of editorial roles*. As journal editorial roles are often not taken into account in academic workloads, strategies implemented at the research institution level will be important for recognising and incentivising editorial service roles relating to the peer review process. Academic institutions could consider more heavily rating peer review and journal editorial board service when weighing tenure and other promotion duties.

Strategies to enhance QPPs at the peer reviewer level

Current state. In contrast to the prior stages of the framework described above, peer review is the only stage at which studies relating to QPPs have been conducted. Peer review has been recognised as a key target in the research lifecycle for improving open science practices and research transparency, improving accuracy of published information, reducing the duration of the peer review process (e.g., Heim, Ravaud, Baron, & Boutron, 2018; Morey

et al., 2016), and many peer reviewers have been found to endorse a need for further training (e.g., Warne, 2016). Specific training in peer review may be particularly important in the case of clinical psychology where there is no one-size-fits-all model that can be applied to peer review given the vast heterogeneity in clinical problems, study design, assessment methods, and populations that are included in clinical psychological research.

Research conducted to date has aimed to examine the effect of various strategies to improve the quality of peer reviews, including: reviewer training; adding reviewers with specific expertise (e.g., statisticians); using guidelines or checklists; conducting “open” peer reviews (whereby the reviewer is identified, rather than anonymous) and blinding reviewers to the names and affiliations of manuscript authors (see Table 3 for a summary of the study methods and findings).

Insert Table 3

A review of the findings in Table 3 indicates that there is very little evidence that reviewer training improves subsequent review quality, or that the use of checklists and guidelines improve manuscript quality (as confirmed in a recent meta-analysis; Bruce et al., 2016). The most promising results have come from the addition of a reviewer with statistical expertise, which was found to be associated with improvements in manuscript quality, though the quality of the peer reviews of these manuscripts remains unexplored. Open peer review was found to have a small favourable impact in some studies, but not others. Those that did find a positive effect observed that open peer review, compared to masked peer review resulted in reviewers spending more time on their reviews. Blinding author identity was found not to affect the quality of the peer review report or rejection rate (but see Bruce et al., 2016).

Apart from the somewhat promising results of including reviewers with specific expertise (e.g., statistics) and open peer review, very little is known about the core

competencies and attributes of effective reviewers as well as characteristics of a good quality review (Galipeau et al., 2015). One study assessing factors that were associated with ‘better reviewers’ based on editor’s blind ratings of review quality highlighted that higher quality reviews were produced by individuals who were under 40 years of age, from strong academic institutions and well known to the editors (Evans, McNutt, Fletcher, & Fletcher, 1993). Similarly, Stossel (1985) found that ‘low-status’ vs. ‘high-status’ reviewers (a factor which tends to correlate with age) were more likely to produce high-quality reviews, and less likely to decline to review. As these characteristics are not amenable to intervention, these findings are not particularly informative for the development of more effective peer review.

Although editors presumably continually evaluate the quality of reviews they receive, likely using this information when selecting future reviewers, few journals systematically collect this information (one exception is *The Annals of Emergency Medicine* which has implemented editor ratings of review quality for each article received (Callaham & Tercier, 2007)). Of the studies that have explored reviewer and review quality, methods of assessment varied across studies, including ordinal rating scales, validated instruments of review quality and quality assessments of manuscripts (Callaham, Baxt, Joseph, & Waeckerle, 1998; van Rooyen, Black, & Godlee, 1999; Arnau et al., 2003; Cobo et al., 2007; Goodman et al., 1994; Godlee, Gale, & Martyn, 1998).

Potential next steps. Research has thus far failed to find consistent positive effects of a variety of interventions aiming to improve the quality of peer reviews. The characteristics that have some support or possible support are summarised in Table 4. Given the considerable heterogeneity within the field of clinical psychological science, requiring editors and reviewers to be skilled in a number of different study designs, it is very possible that clinical psychology researchers may need unique training in peer review. While it is unrealistic to train all peer reviewers to have sufficient expertise to be able to review all the methodologies and designs used in clinical psychological science, specific training with

regard to determining the boundaries of their expertise and how to communicate them may be more appropriate. Similarly, the quality of the peer review process may be strengthened by the selection of *reviewers that have expertise in specific components of a study* and who focus on specific features of manuscript quality as their primary peer reviewing role (e.g., reporting quality, adherence to protocols, accessibility). It may be of interest to explore the addition of other expert reviewers with specific skills required in the field of clinical psychology, such as clinicians or methodological experts.

Insert Table 4

One important next step relates to *defining and measuring what makes a good reviewer and a good review*. Rather than focusing on the characteristics of good reviewers, it has been suggested that assessment at the level of cognitive styles and approaches of good reviewers (e.g., analytical strategies, thought processes) might be a more fruitful avenue to identifying skills and ‘core competencies’ that can be integrated into practice and peer review training programs (Callaham & Tercier, 2007). *Wider adoption of consistent methods for evaluating the quality of peer reviewers and peer reviews* themselves would provide the opportunity to assess both the status quo of reviewer quality and the impact of changes to the process. Finally, a broader *investigation of peer review training efficacy* that follows the principles and guidelines of clinical trial methodology might provide the much needed evidence to evaluate the efficacy of strategies to increase the quality of peer reviews (Heim et al., 2018).

Although the evidence regarding *manuscript checklists* remains mixed (Bruce et al., 2016; Cobo et al., 2011), a standardised checklist such as CONSORT, PRISMA, or journal-specific checklists (see Appendix B of supplementary material) may be useful for guiding the review process and evaluating whether the study information contained in the manuscript is suitably clear, reliable, accurate and accessible (see Appelbaum et al., 2018). Some journals (e.g., the *Nature* research journals) have introduced a checklist to prompt authors to disclose

technical and statistical information in their submissions, and to encourage referees to consider aspects important for research reproducibility (go.nature.com/oloeip). Even if not used in a formal way to accompany the manuscript review submission, reference to a checklist during the review process may reduce cognitive load on reviewers to recall all aspects of a high-quality review.

A final but potentially major consideration is whether reviewers lack *incentive for conducting, and increasing the quality of, peer reviews*. Currently, there is no available research that has explored the possible benefit of incentivising peer reviewing (for some progress in this field, see <https://publons.com/about/home/> for researchers to track and demonstrate their research impact and peer review workload). It may be informative to examine whether engagement in, and the quality of, peer reviews are enhanced by research institution and journal level initiatives to incentivize peer reviewing, such as annual peer-review awards, online training and accreditation, certificates of recognition, and formal recognition of peer reviewing roles within academic work profiles.

Conclusions

The aim of this paper was to consider how questionable research practices can be improved through a specific focus on the publication stages of the research lifecycle. With a goal of enhancing the publication of high-quality manuscripts in which the methods, procedures and results are clear, reliable, accurate and accessible, we suggested an ambitious and aspirational framework and offered various strategies to encourage discussion and implementation of initiatives to improve QPPs. By sharing the burden of responsibility for QPPs across all stakeholder levels within the research community, it was suggested that research practices may be improved if (a) funding bodies considered formally supporting QPPs; (b) research institutions encouraged a culture of research quality and provided internal QPP review processes and ongoing professional development; (c) journals considered

broadening editorial teams, trialling specific QPP roles during the review process, increasing statistical and research design expertise, and providing ongoing professional development; and (d) peer reviewers and authors integrated QPPs during manuscript preparation/peer review processes, engaged in ongoing QPP training, and committed to a personal philosophy of open science and transparency. We provided information and resources that may assist in enhancing QPPs across all levels of the research community and hope that the propositions offered here encourage research institutions, leaders and faculty to discuss, reflect on, and take action towards, integrating QPPs into their professional practice and workplace.

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Journal Pre-proof

Table 1:

Resources to enhance the quality of peer reviews practices.

Resource Type	Description
Online training modules	<p>Elsevier Publishing offers several modules pertaining to the fundamentals of peer review, the peer review process, writing reviews, and the expectations of editors. https://researcheracademy.elsevier.com/navigating-peer-review/fundamentals-peer-review</p> <p>Publons Academy provides a practical peer review training course for early career researchers, including individual feedback on practice peer reviews. https://publons.com/community/academy/</p> <p>Springer provides an online tutorial including an overview of peer reviewing, information about how to evaluate each section of a manuscript, and details what to include in a peer review report. https://www.springer.com/gp/authors-editors/authorandreviewertutorials/howtopeerreview</p> <p>Nature offers an online course covering the foundations of peer review, your role as a reviewer, compiling the peer review report, and ethical guidelines. https://masterclasses.nature.com</p> <p>Vision Learning offers a module on the history of peer review and best practice. https://www.visionlearning.com/en/library/Process-of-Science/49/Peer-Review-in-Scientific-Publishing/159/quiz</p>
Checklists (also see Appendix B)	<p>The EQUATOR (Enhancing the QUALity and Transparency of Health Research) provides checklists and reporting guidelines for assessing different study types, as well as information to identify which guidelines should be used. http://www.equator-network.org/toolkits/peer-reviewing-research/</p> <p>Critical Appraisal Skills Programme offers a number of appraisal checklists to assist with evaluating research. https://casp-uk.net</p> <p>Consolidated Standards of Reporting Trials provides various resources to enhance the reporting of randomised controlled trials (CONSORT). http://www.consort-statement.org/</p> <p>Website for the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). http://www.prisma-statement.org/</p>
Review Examples	Peerage of Science provides examples of high-quality peer review

	<p>reports. https://www.peeraofscience.org/review/review-examples/</p>
Information and Guidelines	<p>Applebaum, Cooper, Kline, Mayo-Wilson, Nezu, & Rao (2018). Journal Article Reporting Standards for Quantitative Research in Psychology: The APA Publications and Communications Board Task Force Report. <i>American Psychologist</i>, 73, 3-25. http://dx.doi.org/10.1037/amp0000191</p> <p>The American Psychological Association (APA) has resources peer reviewers: https://www.apa.org/pubs/journals/resources/reviewers-resources</p> <p>Committee on Publication Ethics provides access to ethical guidelines for peer reviewers. https://publicationethics.org</p> <p>How to Survive Peer Review (2012) by Liz Wagner, Fiona Godlee, and Tom Jefferson – freely available book published by BMJ which includes practical information for peer reviewers. https://www.bmj.com/sites/default/files/attachments/re-sources/2011/07/wager.pdf</p> <p>Taylor & Francis offer guidelines pertaining to best practice in peer reviewing. https://editorresources.taylorandfrancis.com/reviewer-guidelines/</p> <p>Wiley offers guidelines for conducting peer reviews and provides a step-by-step guide to reviewing manuscripts. https://authorservices.wiley.com/Reviewers/journal-reviewers/how-to-perform-a-peer-review/index.html</p>
Information on open research practices	<p>Provides guidance in implementing open practices and links to resources that help authors contribute to the scientific literature in a more open way. https://opennessinitiative.org/guidelines-for-authors/</p> <p>Authors of accepted manuscripts in <i>Psychological Science</i>, <i>Clinical Psychological Science</i>, and <i>Advances in Methods and Practices in Psychological Science</i> can earn up to three badges in recognition of open scientific practices: Open Data, Open Materials, and Preregistration. https://www.psychologicalscience.org/publications/badges</p> <p>OSF is a free, open source service of the Center of Open Science that aims to improve openness, integrity and reproducibility of research by enabling researchers to open their research projects up to the scientific community. https://www.osf.io</p>

Table 2.

Quality standards for openness and transparency of materials and data.

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1. Data should be made publicly available (e.g., online, hosted by a reliable third party).
 2. Stimuli and materials should be made publicly available (e.g., stimulus materials, experimental instructions and programs, survey questions, and other similar materials)
 3. In cases where data or materials are not open, clear reasons are provided in the manuscript (e.g., legal, ethical constraints, or severe impracticality).
 4. Documents containing details for interpreting any files or code should be made available (e.g., how to compile and run software programs)
 5. The location of all electronic files should be advertised in the manuscript.
-

Table 3.

Description of studies aiming to improve review quality. (* denotes findings from the same study)

	Description of Intervention	Outcome Measures	Results
<i>Reviewer Training</i>			
Callaham & Schriger, 2002	Voluntary attendance at 4-hr training workshop on expectations and common methodological errors in manuscripts. (N = 150)	Review quality (editor routing quality scale) of manuscripts submitted to the journal.	No effect.
Callaham, Wears, & Waeckerle, 1998	Voluntary attendance at a 4-hr training workshop on expectations and common methodological errors in manuscripts.	Review quality (editor routing quality scale)	No effect.
Schroter, et al., 2004	Full day workshop vs. self-taught training package vs. no-training control group (N = 609).	Quality of peer review report (using the RQI) Rejection rate Time spent on review.	Self-taught training was associated with higher review quality (not maintained at follow-up). Intervention groups found significantly more errors in manuscripts (not maintained at follow-up). No effect on time taken to complete reviews, or rejection rate.
Callaham, Knopp, & Gallagher, 2002	Provision of feedback to reviewers from editors (N = 51/N = 127).	Review quality (editor routine quality scale).	No effect.
Houry, Green, & Callaham, 2012	Provision of a mentor (high-quality senior reviewer) to new reviewers (N = 50).	Review quality (editor routine rating scale) of manuscripts submitted to the journal.	No effect.
<i>Addition of a Statistical Reviewer</i>			

Arnua, et al., 2003	Addition of a statistical peer reviewer in the usual peer review process.	Final manuscript quality (using the MQAI).	Significant improvement in manuscript quality.
Cobo 2007	Comparison of the addition of a statistical peer reviewer (N = 39)*.	Final manuscript quality (using the MQAI).	Significant improvement in manuscript quality.
<i>Use of Checklist</i>			
Cobo, et al., 2007	Comparison of the addition of reporting guidelines checklist (N = 39)*.	Final manuscript quality (using the MQAI).	No effect.
Cobo, et al., 2011	The use of reporting guidelines checklist compared to the usual process (N= 92).	Final manuscript quality (using the MQAI).	Significant improvement in manuscript quality (though effect was smaller than hypothesised).
<i>Open Peer Review/Blinding of Reviewers</i>			
Alam, 2011	Review of blinded vs. unblinded version of a manuscript (N = 20).	Score given to the manuscript; word count of the review.	No effect.
Das Sinha, Sahni, & Nundy, 1999	Reviewer identity revealed vs. concealed (N = 156)	Quality of the review (editor routine rating scale); rejection rate.	No effect.
Fisher, 1994	Review of blinded vs. unblinded manuscripts (N = 228).	Ratings of articles, compared with number of author previous articles (proxy of quality)	Blinded, but not unblinded, review ratings correlated with author's number of previous articles (i.e., blinded reviews less biased).
Godlee, 1998	Multi-group comparison of combinations of reviewer identity revealed vs. concealed and author identity blind vs. unblinded.	Rejection rate.	Reviewers who were blinded to author identity were less likely to recommend rejection. No effect of revealing reviewer identity.
Justice, 1998	Review of blinded vs. unblinded version	Quality of the peer review (using editor	No effect.

	of a manuscript (N = NR).	routine rating scale).	
McNutt, 1990.	Review of blinded vs. unblinded version of a manuscript (N = NR).	Quality of peer review report (using the RQI); time spent on review.	Blinding improved review quality.
Van Rooyen, et al., 1998	Comparison of blinding/unblinding peer reviewer and author identities (N = NR).	Quality of peer review report (using the RQI); time spent on the review.	No effect.
Van Rooyen, et al., 1999	Reviewer identity revealed vs. concealed (N = 250).	Quality of peer review report (using the RQI); rejection rate; time spent on review.	No effect.
Van Rooyen, Delemtohe, & Evans, 2010	Reviewer identity revealed to general public vs. revealed to the author (N = 471).	Quality of peer review report (using the RQI); time spent on review.	No effect on quality. Revealing identity to general public associated with significantly longer time on the review.
Vinther, et al., 2012	Reviewer identity revealed vs. concealed (N = 380).	Quality of peer review report (using the RQI); rejection rate.	No effect.
Walsh, et al., 2000	Reviewer identity revealed vs. concealed.	Quality of peer review report (using the RQI); rejection rate; time spent on the review.	Revealing identity improved review quality (but not considered large enough to be of "editorial importance"), and longer time spent on review.

Table 4:

Peer review practices with probable and possible support.

Strongly Associated with Good Quality Reviews	Possibly Associated with Good Quality Reviews
<ul style="list-style-type: none"> • Inclusion of a statistical expert in the review process • Reviewer characteristics: <ul style="list-style-type: none"> ○ Under the age of 40 ○ Well known to editor ○ From high-ranked universities ○ Blinded peer review 	<ul style="list-style-type: none"> • Open peer review • Use of guidelines/checklists

Figure 1. Core components of the research lifecycle, highlighting stronger alignment of current strategies to address questionable research practices and reproducibility in relation to project design and implementation stages (left panels) relative to the subsequent publication process (right panels).

Figure 2. Summary of suggestions proposed within the Quality Publication Practices (QPP) Framework

^a see Appendix A in supplementary materials; ^b see Appendix B in supplementary materials; ^c see Appendix C in supplementary materials

Highlights

- Proposes a framework for enhancing quality publication processes
- Makes recommendations at all levels of the research community
- Provides information and resources to enhance quality research publication practices

AUTHOR DECLARATION

We wish to confirm that there are no known conflicts of interest associated with this publication and there has been no significant financial support for this work that could have influenced its outcome.

We confirm that the manuscript has been read and approved by all named authors and that there are no other persons who satisfied the criteria for authorship but are not listed. We further confirm that the order of authors listed in the manuscript has been approved by all of us.

We confirm that we have given due consideration to the protection of intellectual property associated with this work and that there are no impediments to publication, including the timing of publication, with respect to intellectual property. In so doing we confirm that we have followed the regulations of our institutions concerning intellectual property.

We further confirm that any aspect of the work covered in this manuscript that has involved either experimental animals or human patients has been conducted with the ethical approval of all relevant bodies and that such approvals are acknowledged within the manuscript.

We understand that the Corresponding Author is the sole contact for the Editorial process (including Editorial Manager and direct communications with the office). She is responsible for communicating with the other authors about progress, submissions of revisions and final approval of proofs. We confirm that we have provided a current, correct email address which is accessible by the Corresponding Author and which has been configured to accept email from Behaviour Research and Therapy (Elsevier Editorial System)

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