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Innovations in Peer Review and Scientific Publication

Peer Review Innovations

Assessment of Author Demand for Double-blind Peer Review in IOP (Institute of Physics) Publishing Journals

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Objective The main objective of this study is to generate market intelligence on author demand for double-blind peer review (DBPR) in areas of study where single-blind review is the norm, namely, materials science and biomedical physics and/or engineering. In addition to assessing authors' perception of the double-blind model and their satisfaction with the process, the pilot study will also collect data to compare operational aspects of the peer-review process between the single-blind and double-blind models.

Design Alternative submission and peer review sites have been set up for the journals Materials Research Express (MRX) and Biomedical Physics & Engineering Express (BPEX). Authors are able to choose between submitting an article for double-blind or single-blind review. Authors are responsible for anonymizing their manuscript before submitting it for DBPR. The pilot scheme runs for 1 year, from January 2017 to December 2017. A full analysis of data

Table 14. Multiple Regression Analysis for Postdiscussion Overall Scores and Funding Decision in Relation to Individual Reviewer Criteria (n = 635 Applications)[a]

Characteristic	Linear Regression Models: Postdiscussion Overall Score Stratified by Reviewer Type[b]						Logistic Regression Model for Funding (Yes vs No)	
	Model 1: Scientist Reviewers' Overall Scores (R^2 = 0.58)		Model 2: Patient Reviewers' Overall Scores (R^2 = 0.47)		Model 3: Stakeholder Reviewers' Overall Scores (R^2 = 0.51)			
	Estimate (SE)	*P* Value	Estimate (SE)	*P* Value	Estimate (SE)	*P* Value	Odds Ratio (95% CI)	*P* Value
Scientist prediscussion scores for review criteria[c]								
Impact	0.03 (0.04)	.46	0.04 (0.05)	.36	–0.04 (0.05)	.41	1.09 (0.76-1.56)	.64
Potential to improve care and outcomes	0.30 (0.04)	<.001	0.21 (0.05)	<.001	0.29 (0.05)	<.001	0.42 (0.29-0.59)	<.001
Technical merit	0.41 (0.04)	<.001	0.29 (0.04)	<.001	0.37 (0.04)	<.001	0.45 (0.34-0.60)	<.001
Patient-centeredness	0.10 (0.04)	.02	0.08 (0.05)	.09	0.11 (0.05)	.02	0.61 (0.41-0.89)	.01
Engagement	0.10 (0.04)	.009	0.07 (0.03)	.12	0.05 (0.04)	.29	0.95 (0.69-1.28)	.68
Patient prediscussion scores for review criteria[c]								
Potential to improve care and outcomes	0.12 (0.03)	<.001	0.15 (0.03)	<.001	0.08 (0.03)	.01	0.77 (0.64-0.94)	.01
Patient-centeredness	0.05 (0.03)	.09	0.05 (0.03)	.15	0.05 (0.03)	.09	0.85 (0.70-1.04)	.12
Engagement	0.02 (0.03)	.44	0.07 (0.03)	.02	0.04 (0.03)	.17	0.96 (0.81-1.14)	.65
Stakeholder prediscussion scores for review criteria[c]								
Potential to improve care and outcomes	0.08 (0.03)	.007	0.15 (0.03)	<.001	0.12 (0.03)	<.001	0.75 (0.62-0.92)	.004
Patient-centeredness	0.05 (0.03)	.09	0.08 (0.03)	.02	0.09 (0.03)	.005	0.81 (0.64-1.01)	.06
Engagement	0.08 (0.03)	.005	0.11 (0.03)	<.001	0.10 (0.03)	.001	0.89 (0.72-1.09)	.26

[a]All models adjusted for program, review cycle, and characteristics of the principal investigator, including any/none National Institutes of Health funding, any/none clinical degree(s), and years of experience since attaining terminal degree (1-4, 5-9, or 10+). Mean scores were used for the 2 scientist reviewers for this analysis. Applications scored on a scale from 1 (exceptional) to 9 (poor).

[b]Overall score from all reviewers of a given type for the entire in-person panel.

[c]Review criteria scores from preliminary reviewers only.

will take place after 6 months, and the final analysis will take place after 12 months. The percentage of the total of direct submissions to each journal that are submitted for DBPR will be measured and reported. This uptake figure is the primary measure of this study, and prior to the study a significant uptake threshold was set at 10% for MRX and 20% for BPEX. Surveys to submitting authors at the final decision stage measure satisfaction levels with the DBPR process and will be compared with single-blind author satisfaction levels. Double-blind authors are also asked why they chose DBPR rather than single-blind peer review.

Results Initial data from January 2017 to May 2017 show that 20% of direct submissions to MRX were double blind (137 of 677 direct submissions), and BPEX shows a similar uptake (9 of 46 submissions). Peer-review times are slightly shorter for DBPR than for SBPR. Eight authors who chose DBPR have responded to the survey, and 7 of them stated that they chose DBPR because they think it is the most fair. The average satisfaction level with the DBPR experience is 8.5 out of a 10-point scale.

Conclusions These initial results suggest that there is a significant demand from authors for DBPR in these communities. If anything, we feel that this study will underestimate the demand given that DBPR is voluntary and most authors submitting to these journals are not normally in the habit of anonymizing their manuscripts. Further conclusions will be drawn based on the 6-month results in July 2017, in time for the Peer Review Congress in September.

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Use of Open Review by Discipline, Country, and Over Time: An Analysis of Reviews and Journal Policies Posted on Publons

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Objective To understand what forms of open peer review are being used and how these vary by discipline, by country, and over time.

Design We used data from Publons to explore our objectives. Publons is a publisher neutral platform that allows users to record peer reviewer activity and their preferences for signing and/or publishing reviews and also records journal policies on peer review. Publons publishes reviews openly if the reviewer has selected this option, provided the journal policy permits this. We focused on the 7458 journals with at least 10 reviews recorded in Publons as of November 2016. Publons also contains information on the peer review policies of approximately 12% of journals (3692 of 30,000 assuming there are 30,000 English-language journals in the world). We split the data by the country of the reviewer (where there

are at least 100 distinct reviewers) and the discipline of the journal to look at trends in use of open peer review, including the difference between the wishes of reviewers to publish their reviews and journal policies and the current state of policies for open peer review for journals in different fields. The disciplines assessed included life sciences, natural sciences, engineering sciences, humanities, and social and behavioral sciences.

Results Of the 3692 journals analyzed, 3.5% (n=130) allow reviewers to sign their reviews, and 2.3% (n=85) allow or require peer reviews to be published. There are 474,036 reviews in Publons from the 7458 journals that have at least 10 reviews recorded in Publons. Of these reviews, 1.7% (n=7857) are published openly. For an additional 7904 reviews (1.7% of total reviews), the reviewers have indicated that they would prefer Publons to publish the review openly, but the journal policy does not permit this. The rate of published open reviews in Publons varies by country, ranging from 0% in Argentina (0 of 1,076), Czech Republic (0 of 867), Ireland (0 of 1667), and Romania (0 of 1392) to 14.1% (149 of 1058) in Saudi Arabia, and by discipline, ranging from 0.8% (205 of 26,762) for engineering sciences to 2.9% (18 of 615) for humanities.

Conclusions Open peer review is happening in different forms on the Publons platform, but it still accounts for a small percentage of reviews carried out. While these data provide insight into the use of open peer review, it is important to note that the data are sourced from Publons and may not be representative of all scholarly disciplines, countries, open reviews, and open reviewer activity. In addition, we were not able to differentiate the posting of full reviews vs the posting of metadata of reviewer activity. Future research could address these limitations and other aspects of open review.

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Comparison of Acceptance of Peer Reviewer Invitations by Peer Review Model: Open, Single-blind, and Double-blind Peer Review

Maria Kowalczuk,[1] Michelle Samarasinghe[2]

Objective Anecdotal evidence from editors suggests it is more difficult to recruit reviewers for journals that use fully open peer review compared with single- or double-blind peer review. The aim of this study was to determine whether there is a difference in the proportion of reviewers who agree to undertake peer review of manuscripts for journals that use different peer review models in different subject areas.

Design Retrospective analysis of BioMed Central and SpringerOpen journals that use the 3 different peer review models in biomedicine, chemistry, clinical medicine, computer science, earth science, engineering, health sciences, life sciences, mathematics, and physics. We calculated the proportion of invited reviewers accepting an invitation to review or re-review a manuscript per journal per month between June 1, 2001, and July 1, 2015, for single-blind and open peer review journals and between February 1, 2011, and July 1, 2015, for double-blind peer review journals.

Results The proportion of accepted invitations was 49% overall (N = 498 journals), 60% for the 40 journals implementing double-blind peer review, 53% for the 388 single-blind peer review journals, and 42% for the 70 open peer review journals (**Table 15**). Within the 4 subject areas for which data for all 3 peer review models were available—biomedicine, clinical medicine, health sciences, and life sciences journals—the proportion of reviewers accepting invitations to review was lowest for open peer review and highest for the double-blind model. A pairwise proportion test showed statistically significant differences between the proportions of reviewers who agreed to open peer review for the clinical medicine (45%), biomedicine (41%), health sciences (38%), and life sciences (31%) journals. An analysis of single-blind peer review data available for each field showed the proportion for mathematics was higher than for the other subject areas that did not exhibit differences.

Conclusions A smaller proportion of invited reviewers agreed to peer review for journals operating under open and single-blind peer review models compared with journals that use double-blind peer review. As a result, for journals with open and single-blind peer review models, a higher number of reviewers need to be invited. However, these journals have operated under their respective models for many years, so the

Table 15. Numbers of Considered Journals, Reviewer Invitations, and Manuscripts

Peer Review Model	No.					
	Manuscripts Undergoing External Review	Reviewer Invitations Sent	Reviewer Invitations Sent per Manuscript	Reviewers Who Accepted Invitations	Proportion of Accepted Invitations	Accepted Invitations per Manuscript
Double blind (n = 40)	2988	12,471	4.17	7528	0.60	2.52
Single blind (n = 388)	187,332	874,487	4.67	467,642	0.53	2.50
Open (n = 70)	101,606	598,080	5.89	254,086	0.42	2.50
All (N = 498)	291,926	1,485,038	5.09	729,256	0.49	2.50

discrepancy between these proportions does not seem to be detrimental to the success of a journal.

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A Novel Open Peer Review Format for an Emergency Medicine Blog

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Objective The medical education blog Academic Life in Emergency Medicine (ALiEM) has developed a new, open, inline peer review publication format that presents reviewer commentary within the body of the content. We hypothesized that the proximity and interactive nature of inline text will increase webpage engagement and investigated the association of this format with reader behavior.

Design We wrote 2 ALiEM blog posts for the purpose of this study. Each post was reviewed by a pair of expert peer reviewers to produce 3 publication versions: (1) control post with no expert peer review; (2) traditional post with expert peer review appended to the end of the post content; and (3) experimental post, which used inline text throughout the content. Website visitors were randomized to view either the control, traditional, or experimental version using a custom Google Analytics Content Experiment. Google Analytics, paired with a customized JavaScript activity tracker, and CrazyEgg, an industry standard web visualization suite, captured user demographic information, active users every 5 seconds, bounce rate, user click activity, and user scroll activity over a 1-month time period. We compared measures using the χ^2 test.

Results Data collection is in progress, and we report the first blog post's preliminary analytic data. During the period from June 4 to 9, 2017, 502 views were captured across the 3 versions of the post (196 views of the control post, 149 views of the traditional post, and 157 views of the experimental post). Bounce rates were nearly identical across groups (73.6%-73.9%; $P > .99$). The time users spent viewing each blog post, measured as active users present over increments of 5 seconds, was not statistically significantly different (median time of 50 seconds [interquartile range, 20-90 seconds] viewing the control post, 50 seconds [interquartile range, 20-95 seconds] viewing the traditional post, and 45 seconds [interquartile range, 20-99 seconds] viewing the experimental post; $P = .46$). There were no apparent differences in user scrolling data. However, pages featuring inline peer review comments had a statistically significantly greater proportion of clicks on summative peer review content than posts with traditional commentary (15.21% experimental vs 8.92% traditional; $P < .03$).

Conclusions The inline peer review publication system does not appear to alter reading times, bounce rates, or scrolling activity. Readers did, however, click to open peer review content more when viewing the inline version compared with the traditional post. The preliminary data suggest that expert inline commentaries might increase the value of scientific content published online by increasing the visibility of published peer review content for readers. Future studies should examine the association of transparent, inline expert peer reviews with reader cognitive load and learning.

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Editorial and Peer-Review Process Innovations

Impact of a Change in Editorial Policy at Nature Publication Group (NPG) on Their Reporting of Biomedical Research

Malcolm Macleod,[1] for the NPQIP Collaborative Group

Objective To determine whether a change in editorial policy, including the implementation of a checklist, was associated with improved reporting of measures that might reduce the risk of bias.

Design In this before-after study, we included articles that described research in the life sciences published in Nature Publication Group (NPG) journals that were submitted after implementation of mandatory completion by authors of a checklist at the point of manuscript revision (May 1, 2013, to November 1, 2014). We compared these with articles describing research in the life sciences published in Nature journals that were submitted before May 2013. Similar articles in other journals were matched for date and topic. We investigated the change in proportion of articles published before and after May 2013 reporting 4 criteria: information on randomization, blinding, sample size calculation, and exclusions. We included 448 articles published in NPG journals (225 [50.2%] published before May 2013 and 223 [49.8%] published after) that were identified by an individual hired by the NPG for this specific task, working to a standard procedure; an independent investigator used PubMed's Related Citations feature to identify 447 similar articles with a similar topic and date of publication in other journals. We then redacted all publications for time-sensitive information and journal name. Redacted articles were assessed by 2 trained reviewers against a 74-item checklist, with discrepancies resolved by a third reviewer.

Results In total, 392 NPG articles and 353 similar articles in other publications described in vivo research. The number of NPG articles meeting all 4 criteria increased from 0 of 203 prior to May 2013 to 31 of 181 (17.1%) after (2-sample test for equality of proportions without continuity correction; χ^2 = 36.156; *df* = 1; *P* < .001). There was no change in the proportion of similar articles in other publications meeting all 4 criteria (1 of 164 [0.6%] before; 1 of 189 [0.5%] after). Agreement between reviewers ranged from 72% (for "Does the manuscript describe which method of randomization was used to determine how samples/animals were allocated to experimental groups?") to 90% (for "Does the manuscript describe how the sample size was chosen to ensure adequate power to detect a prespecified effect size?").

Conclusions There was a substantial improvement in the reporting of measures that might reduce the risk of bias in in vivo research in NPG journals following implementation of a mandatory checklist policy, to a level that, to our knowledge, has not been previously observed in science journals. However, there remain opportunities for further improvement.

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Assessment of Signing Peer Reviews in Principle and in Practice at Public Library of Science (PLOS) Journals

Elizabeth Seiver,[1] Helen Atkins[1]

Objective To investigate the rate at which Public Library of Science (PLOS) peer reviewers at 3 medical journals chose to sign or not sign their reviews, thus revealing or not revealing themselves to the authors of an article, and whether authors' and reviewers' stated values about signing reviews matched their behavior.

Design Historical review signing data from 3 PLOS journals (*PLOS Computational Biology*, *PLOS Medicine*, and *PLOS ONE*) from mid-2013 through 2016 were analyzed. In addition, 1-click multiple choice surveys were appended to current system-generated emails, which were sent at the time of manuscript and review submission, to authors and reviewers; these surveys asked them about their general experience with, and preference for, signing reviews. The survey landing page included detailed follow-up questions about their selection, and comments were coded for qualitative analysis. The signing and survey data sets did not share unique identifiers and thus were not matched 1:1.

Results Of 451,306 total reviews analyzed, 34,561 (7.7%) were signed. This was higher for *PLOS Medicine* than for the other 2 journals (**Table 16**). Although the *PLOS Computational Biology* authors reported that they had received signed reviews (27 of 71 [38.0%]), the reviewers reported that they did not usually sign their reviews (75 of 627 [12.0%]). Combining all 3 PLOS journals, we found that 509 of 1072 authors preferred to receive signed reviews (47.5%) and that 372 of 2359 reviewers reported usually signing them (15.8%). In follow-up comments, the reviewers who reported usually signing reviews made the argument that signing their reviews improved accountability and constructiveness; the reviewers who reported usually not signing cited as their motivation the ability to be more honest and fear of retribution. Many reviewers who had not signed reviews simply stated that they had never been asked before or were not sure of the benefits. Authors who favored receiving signed reviews valued having the additional information on the reviewer's area of expertise and potentially having more open communication.

Conclusions The 3 PLOS journals represent different research communities with diverging attitudes and behavior toward signing reviews. *PLOS Medicine* maintains a strong tradition of review signing, whereas the *PLOS Computational Biology* community, despite familiarity with open review, tends to be fairly conservative about signing reviews. For journals wishing to encourage the adoption of signed reviews, it may be helpful to directly request a signature, provide signing incentives, describe the benefits of signing, or encourage reviewers to understand the author's perspective.

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The Role of Persistent Identifiers in the Peer Review Process: Use of ORCID

Alice Meadows[1]

Objective When widely adopted and embedded in the research infrastructure, persistent identifiers (PIDs) enable interoperability between systems, reducing errors caused by manual data entry and saving researchers time. This study presents initial results from 2 analyses of PID adoption and use of ORCID (Open Researcher and Contributor Identifier). The first is an analysis by the Technical and Human Infrastructure for Open Research (THOR), a European Union–funded ORCID partner organization, of the uptake of ORCID identifiers. The second analysis reviews uptake of the peer review functionality associated with ORCID identifiers, which was introduced in October 2015.

Design The THOR study analyzes uptake of PIDs across 4 broad disciplines (20 subdisciplines) and 5 geographic regions to develop a baseline comparator using publicly available data on the location and journal publications of ORCID registrants and Science Metrix's subject fields. The

Table 16. Data on Reviews Signed at Each Journal

Journal	Reviews Signed, No./Total No. (%)				
	2013	2014	2015	2016	Total
PLOS ONE	3272/48,358 (6.8)	10,607/139,346 (7.6)	9849/134,800 (7.3)	8327/114,771 (7.3)	32,055/437,275 (7.3)
PLOS Medicine	159/437 (36.4)	495/1348 (36.7)	508/1280 (39.7)	533/1603 (33.3)	1695/4668 (36.3)
PLOS Computational Biology	NA	73/1055 (6.9)	300/4234 (7.1)	338/4074 (8.3)	711/9363 (7.6)
Total	3431/48,795 (7.0)	11,175/141,749 (7.9)	10,657/140,314 (7.6)	9198/120,448 (7.6)	34,461/451,306 (7.6)
	Survey Questions, No./Total No. (%)				
	How often do you sign your reviews? [reviewers]	Do you prefer signed reviews? [authors]	Have you received signed reviews? [authors]	Have you received signed reviews? [reviewers]	
PLOS ONE	257/1467 (17.5) Usually sign	486/1038 (46.8) Prefer signed	630/2108 (29.9) Yes	407/1751 (23.2) Yes	
PLOS Medicine	40/265 (15.1) Usually sign	8/11 (80.0) Prefer signed	17/34 (50.0) Yes	28/65 (43.1) Yes	
PLOS Computational Biology	75/627 (12.0) Usually sign	15/23 (65.2) Prefer signed	27/71 (38.0) Yes	50/123 (40.7) Yes	
Total	372/2359 (15.8) Usually sign	509/1072 (47.5) Prefer signed	674/2213 (30.5) Yes	485/1939 (25.0) Yes	
	Emails sent, No.				
PLOS ONE	7209	4907	8369	11,620	
PLOS Medicine	1569	354	879	416	
PLOS Computational Biology	3985	182	394	965	
	Response Rate, %				
PLOS ONE	20	21	25	15	
PLOS Medicine	17	3	4	16	
PLOS Computational Biology	16	13	18	13	

Abbreviations: PLOS, Public Library of Science; NA, not available.

preliminary results of this analysis provided context for the study on uptake of ORCID's peer review functionality. From October 2015 to the end of May 2017, 135,605 review activities were added to 9803 ORCID records by 9 organizations. Focusing on data from 3 early adopters (Publons, the American Geophysical Union, and *F1000*, collectively representing 99.59% of total use), use to date was assessed, including the number of reviewers whose ORCID records contain review activities, whether this information is publicly available, the number of review activities added (including number of DOIs where applicable), and number of participating journals. This information was supplemented by informal feedback from reviewers about the functionality and its benefits and drawbacks.

Results The discipline-only analysis of ORCID (487,471 ORCID records; 3,703,958 publications) showed the top share of ORCID in clinical medicine (507,230 publications [13.7%]), technology and other applied sciences (468,676 publications [12.7%]), and biology (454,468 publications [12.3%]). Built and environmental design had the least uptake (9800 publications [0.3%]). The regional-only analysis (785,020 ORCID records) showed the most uptake of ORCID in Europe (326,136 records [41.5%]) and the least uptake in the Middle East and Africa (36,768 records [4.7%]). In terms of ORCID's peer review functionality, Publons is the top user. Of the 151,973 Publons users as of the end May 2017, 10,471 (6.89%) have connected a total of 125,892 review activities to their ORCID records. This represents 92.8% of all review activities in ORCID. In addition, *F1000* has connected 5714 reviews (4.21%) to ORCID records and the American Geophysical Union has connected 3455 reviews (2.55%). The number of participating journals from these 3 organizations was 8763. Initial feedback from participating reviewers indicates that they find the functionality of linking reviewer activity to ORCIDs valuable. However, there is a low level of knowledge and understanding of the option to connect review activities to ORCID records among reviewers, journals, and their organizations, indicating a need for increased outreach and education.

Conclusions Use of PIDs—both in general and for peer review activity—varies by discipline and country. If widely adopted in a variety of peer review workflows in the future, ORCID could help address issues around recognition for peer review in all its forms.

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Introduction of Patient Review Alongside Traditional Peer Review at a General Medical Journal (*The BMJ*): A Mixed Methods Study

Sara Schroter,[1] Amy Price,[1,2] Rosamund Snow,[1,3] Tessa Richards,[1] Sam Parker,[1] Elizabeth Loder,[1] Fiona Godlee[1]

Objective To evaluate the feasibility of incorporating patient reviews into the traditional peer review process at *The BMJ*.

Design This was a mixed methods study including a comparison of acceptance and completion rates and timeliness to review between patient reviewers and traditional reviewers for articles sent for peer review in 2016. We also surveyed the patient reviewers and research editors on their views of the value of patient reviews.

Results In 2016, 359 of 647 research articles (55%) sent for review had at least 1 patient reviewer invitation. For review invitations in 2016, the agreement rate for patient reviewers was 287 of 677 (42%) and the completion rate was 224 of 287 (78%); for traditional reviewers, the agreement rate was 2649 of 6998 (38%) and the completion rate was 2217 of 2649 (84%). Patient reviewers took a mean (SD) of 10.5 (5.9) days to complete a review after agreement compared with 13.4 (7.7) days for traditional reviewers. Overall, 122 of 164 patient reviewers (74%) responded to a survey, and 100 of those patient reviewers (82%) would recommend being a patient reviewer for *The BMJ* to other patients and carers. One hundred seven of the patient reviewers who responded to a survey (88%) think more journals should adopt patient review, and 98 (80%) did not have any concerns about doing open review. Of the 20 patient reviewers who reviewed papers that were returned to the authors for revisions, 15 agreed or strongly agreed that the authors addressed their points, and 15 agreed that the authors were courteous when addressing their points. Twelve patient reviewers who reviewed papers that were returned to the authors for revisions felt they included points important to patients that were not raised by the traditional reviewers. Seven of 8 research editors responded to the editor survey; 5 of 7 reported patient reviews currently add "a little" value to research papers; and 2 of 7 believed patient reviews add "a lot" of value to research papers. However, 5 of 7 research editors found it difficult to identify appropriate patient reviewers, and 5 of 7 experienced difficulty communicating with patient reviewers about articles. All editors reported patient reviewers "occasionally" include insights not raised by other reviewers; 6 of 7 editors "occasionally" and 1 of 7 editors "frequently" find patient reviewers' comments helpful when advising authors on revisions to manuscripts. Four editors felt that other journals should adopt patient review, and 3 were unsure.

Conclusions Patient review of research is feasible alongside a standard peer review process and is considered beneficial by some editors and important by patients and carers. Further qualitative research should capture the value of the changes made to manuscripts as a result of patient reviews.

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Conflict of Interest Disclosures: Dr Schroter, Dr Richards, Mr Parker, Prof Loder, and Dr Godlee are employees of *The BMJ*; Dr Snow was also an employee of *The BMJ*. Dr Godlee is a member of the Peer Review Congress Advisory Board but was not involved in the review or decision for this abstract. Dr Price is a Research Fellow at *The BMJ*.

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Additional Information: Dr Rosamund Snow is deceased.

Prepublication and Postpublication Issues

Associations Between bioRxiv Preprint Noncitation Attention and Publication in the Biomedical Literature: A Cross-sectional and Cohort Study

Stylianos Serghiou[1], John P. A. Ioannidis[1-4]

Objective To describe associations between bioRxiv preprint traffic, Altmetric scores, and eventual publication and to compare the attention ex-preprints receive when published in the canonical literature with the attention given to published articles not prepublished on bioRxiv.

Design We downloaded all preprints available on bioRxiv through January 17, 2017; all metrics available for each preprint; all data held for each preprint by Altmetric; and all data held by Altmetric and PubMed for published articles of previous preprints, which are identified in bioRxiv. We randomly chose 211 published articles that had been bioRxiv preprints, randomly identified 5 journal and time-matched control articles that had not been preprinted on bioRxiv, and compared Altmetric data. We compared means using pairwise *t* and Wilcoxon signed rank tests, estimated associations between the preprint covariable for the field of study and canonical publication using a multivariable Cox proportional hazards model, and compared matched data using a mixed-effects model with random intercept.

Results Of 7760 preprints, median traffic to abstracts was 943 (range, 6-192,570) and median traffic to PDFs was 331 (range, 16-151,520). Median Altmetric score was 7.3 (range, 0.25-2506) with a heavy right skew. Two thousand thirty-one preprints (36%) reached the canonical literature within a year of being uploaded and had a higher mean Altmetric score (19.5 vs 11.4, $P = 3.8 \times 10^{-8}$) than articles that had not reached the canonical literature within a year. After adjusting for the field of study, the Altmetric score remained a statistically significant but weak variable associated with eventual publication (hazard ratio, 1.005; 95% CI, 1.002-1.007). Once a preprint article is published, the pairwise absolute mean difference in Altmetric score was 14.9 points higher than what it was as a preprint on bioRxiv ($P = 10^{-5}$). The biggest

contributor to this difference was the number of citations by the mainstream media (pairwise absolute mean [SE] difference, 16.6 [3.8]). Articles that had previously been posted on bioRxiv attracted significantly more attention than controls once they were published (mean difference, 19.2; 95% CI, 5.5-32.8).

Conclusions Many preprints on bioRxiv attract significant noncitation attention and reach canonical publication. The Altmetric score is not meaningfully associated with eventual publication, but articles that had been posted on bioRxiv tend to receive more attention once published than articles that had never been posted on bioRxiv.

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Differences in Readership Metrics and Media Coverage Among Negative, Positive, and Mixed Studies Published by the *New England Journal of Medicine*

Ramya Ramaswami,[1] Sagar Deshpande,[2,3] Rebecca Berger,[1] Pamela Miller,[1] Edward W. Campion[1]

Objective Negative studies are defined as reports where there is no statistical difference between groups in the primary outcome. These studies may not be published owing to several factors, including hesitation by authors to submit negative studies for publication. When negative studies do proceed to publication, it is unclear how much attention they receive from readers and the media. We analyzed whether there were differences in readership metrics and media coverage among negative, positive, and mixed studies published by the *New England Journal of Medicine* (*NEJM*).

Design NEJM.org tracks and displays metrics on readership and media coverage using 3 online analytic sources: Atypon.com, Crossref, and Cision. We retrieved information on page views (number of times the article was accessed online), citations (number of citations by peer-reviewed journals), and media coverage (number of unique media mentions) for all reports of clinical trials published in *NEJM* between 2012 and 2015. Readership and media coverage metrics were collected from date of publication through January 2017. The papers were labeled as negative, positive, or mixed (discordant coprimary end points) based on results for the study end points. Readership metrics and media coverage means for the 3 groups were assessed by analysis of variance (ANOVA), and adjustments for multiple comparisons were made using the Scheffé method.

Results A total of 338 articles were included in the analysis, of which 73 (22%) were negative studies, 224 (66%) were positive, and 41 (12%) were mixed. There was 100% agreement on classification of articles by 2 authors (S.D. and P.M.). For the 73 negative studies, the article metrics were as follows: page views, 58,728; citations, 93; media coverage, 101. For the 224 positive studies, the article metrics were as follows: page views, 64,364; citations, 88; media coverage, 120. For the 41 mixed studies, the article metrics were as follows: page views, 43,810; citations, 62; media coverage, 65. There were no statistically significant differences across the 3 groups in mean page views, mean citations, and mean media coverage (**Table 17**). Following adjustment for multiple comparisons, there were no statistically significant differences in readership or media coverage metrics among the 3 groups. A larger study would be required to assess the generalizability of these findings to other journals and to evaluate other factors that influence postpublication metrics.

Conclusions There was no difference in mean page views, citations, and media coverage among positive trials, negative trials, and trials with mixed outcomes published at NEJM.org.

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Table 17. Mean Page Views, Citations, and Media Coverage in Negative, Positive, and Mixed Studies

Variable	73 Negative (95% CI)	224 Positive (95% CI)	41 Mixed (95% CI)	Unadjusted *P* Value
Page views	58,728 (57,707-59,749)	64,364 (63,712-65,015)	43,810 (42,408-45,212)	.16
Citations	93 (89-96)	88 (87-90)	62 (58-65)	.47
Media coverage	101 (97-105)	120 (118-121)	65 (61-69)	.09

Reproducible Research Practices in Systematic Reviews of Therapeutic Interventions: A Cross-sectional Study

Matthew J. Page,[1] Douglas G. Altman,[2] Larissa Shamseer,[3,4] Joanne E. McKenzie,[1] Nadera Ahmadzai,[5] Dianna Wolfe,[5] Fatemeh Yazdi,[5] Ferrán Catalá-López,[5,6] Andrea C. Tricco,[7,8] David Moher[3,4]

Objective Biomedical researchers are increasingly encouraged to use reproducible research practices, which allow others to recreate the findings, given the original data. Such practices include providing a detailed description of the data collected and used for analysis, clearly reporting the analysis methods and results, and sharing the data set and

statistical code used to perform analyses (within the journal article, a supplementary file, or a data repository). To our knowledge, there has been no investigation into how often such practices are used in systematic reviews (SRs) across different specialties. We aimed to investigate reproducible research practices used in a cross-section of SRs of therapeutic interventions.

Design We selected articles from a database of SRs we assembled previously, which included a random sample of 300 SRs that were indexed in MEDLINE during February 2014. In the current study, we included only those SRs that focused on a treatment or prevention question and reported at least 1 meta-analysis. One author collected data on 28 prespecified items that characterized reproducible research practices from the SR article and any supplementary files; a 20% random sample was collected in duplicate. We did not contact authors of the SRs for additional information. We calculated risk ratios to explore whether reproducible research practices differed between Cochrane and non-Cochrane SRs.

Results We evaluated 110 SRs; 78 (70.9%) were non-Cochrane articles, and 55 (50.0%) investigated a pharmacological intervention. The SRs presented a median (interquartile range) of 13 (5-27) meta-analyses. Authors of SRs reported the data needed to recreate all meta-analytic effect estimates in the SR, including subgroup meta-analytic effects and sensitivity analyses, in only 72 of 110 SRs (65.5%). This percentage was higher in Cochrane than in non-Cochrane SRs (94% vs 54%) (**Figure 7**). Despite being recommended by PRISMA, summary statistics (eg, means and SDs) of each individual study were not reported for 31 of 110 index (ie, primary or first-reported) meta-analyses (28.2%). Authors of SRs who reported imputing, algebraically manipulating, or obtaining some data from the included studies' authors/sponsors infrequently stated which specific data were handled in this way. Only 33 SRs (30.0%) mentioned access to data sets and statistical code used to perform analyses.

Conclusions Reproducible research practices in SRs of therapeutic interventions are suboptimal. Authors of SRs should make greater use of public data repositories (eg, the Systematic Review Data Repository or Open Science Framework) to share SR data sets and statistical analysis code so that others can recreate the findings, check for errors, or perform secondary analyses.

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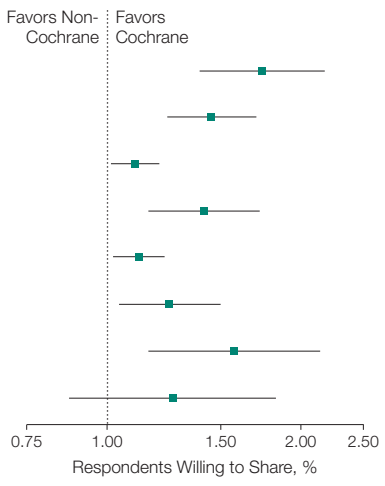
Figure 7. Risk Ratio (RR) Associations Between Type of Systematic Review (Cochrane vs Non-Cochrane) and Reproducble Research Practices

	RR (95% CI)	Cochrane No./Total No.	Non-Cochrane No./Total No.
Reported data need to recreate all meta-analyses	1.74 (1.39-2.18)	30/32	42/78
Reported data needed to recreate all core meta-analyses	1.45 (1.24-1.70)	32/32	53/78
Reported data needed to recreate the index meta-analysis	1.10 (1.01-1.20)	32/32	70/78
Reported summary statistics for each individual study in the index meta-analysis	1.41 (1.16-1.73)	29/32	50/78
Reported effect estimate and 95% CI for each individual study in the index meta-analysis	1.12 (1.02-1.23)	32/32	69/78
Reported the type of random-effect model used	1.25 (1.04-1.50)	13/13	38/49
Reported data needed to recreate all subgroup analyses for the index meta-analysis	1.58 (1.16-2.14)	9/9	20/33
Reported data needed to recreate all sensitivity analyses for the index meta-analysis	1.26 (0.87-1.83)	11/14	23/37



Postpublication Issues

Analysis of Indexing Practices of Corrected and Republished Articles in MEDLINE, Web of Science, and Scopus

Tea Marasović,[1] Ana Utrobičić,[2,3,4] Ana Marušić[3,4]

Objective Recently updated International Committee of Medical Journal Editors (ICMJE) recommendations suggest correcting honest errors by "retraction with republication of the changed paper, with an explanation." MEDLINE uses "Corrected and Republished Article" to indicate correction of "a previously published article by republishing the article in its entirety." We assessed how other bibliographical databases indexed article corrections with replacement.

Design Articles indexed as "Corrected and Republished Articles" in MEDLINE from January 2015 to December 2016 (n = 29) were analyzed for the information presented in journals and in the Web of Science (WoS) and Scopus. Two authors independently extracted the data and reached a consensus for disagreements.

Results Twenty-nine articles were published in 24 biomedical journals from different research areas (all articles were indexed in Scopus and all but 3 indexed in WoS; median Impact Factor for WoS journals, 2.98; 95% CI, 2.15-3.35). Half of the journals published a separate item to indicate correction, and half had a CrossMark tag on the corrected article (**Table 18**); CrossMark tags had no links to the original article or notification of correction. PubMed did not provide the links between the corrected to the original article in 1 case. Web of Science and Scopus indexed corrected articles most often as a correction (WoS) or erratum (Scopus). Five articles in WoS (17%) and 11 in Scopus (38%) were indexed as "articles" in the same way as original articles, which made it difficult to differentiate between the versions. When corrected articles were indexed, they often lacked links to the original articles. Original and corrected articles had a similar median number of citations (WoS: original, 2.0; 95% CI, 2.0-4.2; corrected, 2.0; 95% CI, 1.0-6.8; Scopus: original, 2.0; 95% CI, 1.0-4.4; corrected, 2.0; 95% CI, 1.0-10.2). A PubMed search for "retraction and replacement" identified 5 more articles published in *JAMA*, which were indexed only as retracted and not as corrected and republished publications. Web of Science indexed only 1 version of these articles, and the notices of retraction and replacement were indexed as a "letter," "correction," or "editorial material." Scopus also indexed all 5 articles, and notices were indexed as a "letter" or "erratum" (1 was missing).

Conclusions There seem to be serious discrepancies in indexing corrected and republished articles in major databases, which diminishes the credibility and transparency of the research and publication system. While scientific self-correction should be supported, all stakeholders in the publication process should commit to ensuring that published scientific articles are appropriately indexed, interlinked, updated, and/or amended in a timely and efficient manner.

Table 18. Characteristics of 29 Articles Indexed by MEDLINE as "Corrected and Republished Article" from 2015 to 2016 and their Indexation in Web of Science and Scopus

Characteristic	Journal[a]	WoS	Scopus
Corrected article published as separate article	25	NA	NA
Separate item published to indicate correction	15	NA	NA
Correction indicated in the republished article	15	NA	NA
CrossMark tag present	15	NA	NA
Original article indexed	NA	23	22[b]
Corrected article indexed as	NA	22	25[b]
Article	NA	5	11
Article; retracted publication	NA	2	NA
Correction (WoS/Scopus)	NA	11	1
Erratum (Scopus)	NA	NA	11
Editorial material	NA	2	NA
Reprint	NA	1	NA
Review	NA	1	1
Note	NA	NA	1
Corrected article links to original article	NA	12	8[c]
Separate item indicating correction indexed as	NA	9	10
Correction (WoS) or erratum (SCOPUS)	NA	9	9
Note	NA	NA	1
Separate item indicating correction links to original article	NA	9	10

Abbreviations: NA, not applicable; WoS, World of Scieince.

[a]Full text of 1 article could not be obtained, so 28 articles were used for analysis in this category.

[b]One article was indexed twice (considered as a single indexation in this table).

[c]In 1 case, only the link to the journal title was provided, without other identifying article elements.

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A Cross-sectional Study of Commenters and Commenting in PubMed, 2014 to 2016: Who's Who in PubMed Commons

Melissa D. Vaught,[1] Diana C. Jordan,[1] Hilda Bastian[1]

Objective Authors indexed in PubMed are eligible to join PubMed Commons and post English-language comments that appear directly below abstracts in PubMed. Journal club membership was introduced in 2014. We sought to describe

characteristics of commenters and the extent of collaborative and author comments and replies.

Design Basic usage data were collected for comments posted from January 2014 to December 2016 (online February 2017). We evaluated a 6-month subset for collaborative and author posts, as well as for commenters' gender, country, and conflict of interest disclosure.

Results At the close of 2016, 10,736 individuals and 24 journal clubs had joined PubMed Commons. From 2014 to 2016, 5483 comments were posted to 4372 publications, with 13% of individuals (n=1410) and 71% of journal clubs (n=17) commenting. The mean (range) number of comments per active individual was 4 (1-196), with 38% (n=537) posting more than 1 comment. For active journal clubs, the mean (range) was 8 (1-27), with 82% (n=14) posting multiple comments. From July 2016 to December 2016, 953 comments (17% of the 3-year total) were posted to 776 publications (18% of the 3-year total) by 332 members and a further 69 named coauthors (**Table 19**). Commenters were primarily from 5 English-speaking countries (n=244 [63%]) and 21% of all commenters were women. Authors posted 71 replies (8%) and 109 other comments (11%). Collaborative comments accounted for 21% of posts, including multiauthored and collective (eg, journal club) comments. Conflict of interest disclosures were formally or informally disclosed rarely (23 instances), often to declare an absence of conflicts of interest.

Conclusions Most individual members of PubMed Commons have not commented, although a small number of members account for a considerable proportion of comments. Comments rarely include conflict of interest disclosures. Geographic distribution of commenters is not representative of authors in the biomedical literature, and women are underrepresented. Author replies are uncommon. Many comments are collaborative posts.

Table 19. PubMed Commons Commenter Characteristics, July to December 2016

Characteristic	No. (%)
PubMed Commons Journal Clubs	8
Individual PubMed Commons members	324
Additional named coauthors[a]	69
Geographic location of individual members and named coauthors[b]	389
Europe	168 (43)
North America	163 (42)
Asia or Oceania	38 (10)
Other	20 (5)
Unknown	4 (1)
Gender of individual members and named coauthors[b]	387
Male	304 (79)
Female	83 (21)
Unknown	6 (1)

[a]Individuals listed as coauthor of a comment posted from an individual PubMed Commons account.

[b]For individual PubMed Commons members and named coauthors (n = 393), geographic location and gender were determined.

[1]PubMed Commons, National Center for Biotechnology Information (NCBI), US National Library of Medicine (NLM), National Institutes of Health (NIH), Bethesda, MD, USA, melissa.vaught@nih.gov

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The Role of PubPeer Comments in Alerting Editors to Serious Problems With Clinical Research Publications

Elizabeth Wager,[1,2] Emma Veitch[3]

Objective PubPeer is a self-described "online journal club" that facilitates commenting on published biomedical literature. We sought to determine how often postpublication comments on PubPeer identify serious misconduct or errors in clinical research articles, how often editors are alerted to problems via PubPeer, and how editors and authors respond.

Design Two raters independently categorized all comments on PubPeer about research publications in *BMC Medicine*, *The BMJ*, and *The Lancet* from first comment appearance (October 2013) to December 31, 2016 (comments on editorials, letters, news, etc were counted but not analyzed). The categories, developed iteratively and by consensus, included well-supported allegations of fabrication, falsification, or plagiarism (FFP); vague FFP allegations (presenting no evidence); allegations of other misconduct; honest error; and methodological concerns. Differences were resolved by discussion. We contacted editors to ask whether PubPeer alerted them to the allegations and how they responded.

Results We found 344 PubPeer comments relating to 150 articles. Of 177 comments relating to 99 research articles, 106 (60%) were imported from PubMed Commons (PMC) (all signed, as required by PMC), of which 11 (6%) were from journal clubs. Of the non-PMC comments, 67 (94%) were anonymous. Of the 177 comments on research articles, 7 (4%; 2 signed) made allegations about or mentioned investigations into FFP in 4 articles (3 strong, 4 vague), 5 (3%; 4 signed) identified errors in 5 articles (mainly concerning trial registration identifier numbers), 29 (16%; 26 signed) raised methodological issues about 20 articles, and 16 (9%) discussed clinical implications. Fifty-nine comments (33%) contained little or no text but gave links to other sites (eg, journal articles, blogs, retraction notices), and 10 (6%) provided extra information without criticism. Journal editors were unaware of the PubPeer postings about their published articles but had independently issued corrections (3) or expressions of concern (2). Authors responded on PubPeer to comments about 4 articles (4%). Commentary on other types of research (eg, comments on basic science, which occur more

frequently on PubPeer than comments on clinical studies), on other sites, and other editors' responses may be different from that on PubPeer.

Conclusions Only 7% of comments on 9 research articles in our sample raised issues that might require journal action (7 fraud, 5 error). The 3 journals had not been alerted to problems via PubPeer but were generally aware of the concerns from other sources and issued corrections (3), or expressions of concern (2). While PubPeer provides a useful forum for postpublication comments, the frequency of comments requiring journal action in our clinical journal sample was low.

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