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Open Peer Review: The Current Landscape and Emerging Models

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Abstract

Open peer review (OPR) is an important innovation in the open science movement. OPR can play a significant role in advancing scientific communication by increasing its transparency. Despite the growing interest in OPR, adoption of this innovation since the turn of the century has been slow. This study provides the first comprehensive investigation of OPR adoption, its early adopters and the implementation models used. We identified 174 current OPR journals and analysed their wide-ranging implementations to derive emerging OPR models. The findings suggest that: 1) there has been a steady growth in OPR adoption since 2001 when 38 journals initially adopted OPR; 2) OPR adoption is most prevalent in medicine and the natural sciences; 3) three publishers are responsible for 87% of identified OPR journals; 4) early adopter publishers have implemented different models of OPR resulting in different levels of transparency. Across the variations in OPR implementations, two important factors define the degree of transparency: open identities and open reports. Open identities may include reviewer names and affiliation as well as credentials; open reports may include timestamped review histories consisting of referee reports and author rebuttals. When and where open reports can be accessed are also important factors indicating the OPR transparency level. Dimensions that characterize the observed OPR models are outlined.

Introduction and Literature Review

Peer review has been a critical process in scholarly communication. The mainstream peer review systems in scientific and scholarly communication, which typically operate anonymously (Kriegeskorte, 2012), have been criticized for being a flawed process (Smith, 2006) or broken system (Belluz, Plumer & Resnick, 2016). Peer review bias and unfairness exist to various degrees in different disciplines (Lee, Sugimoto, Zhang, and Cronin, 2013; Rath & Wang, 2017). The e-publishing era has also witnessed serious contemporary problems, among others, "predatory" open access (OA) journals as reported in Bohannon's experiment (2013) and a "peer review ring" scandal resulting in the retraction of 60 articles by a prestigious publisher's journal (Barbash, 2014).

As a contrast to the traditional, closed-peer review system, open peer review (OPR) pursues openness and transparency in the process of peer review by making the identities of the author and the reviewer of the manuscript known to each other and/or making available review reports alongside a paper or as separate entities linked to the paper. Transparency in peer review is not a new idea. It was rigorously studied by researchers for the journal *BMJ* in the 1990s. The researchers found that making reviewer identities known to authors or posting reviewer names with the paper had no effect on the quality of the reviews (Godlee, Gale, & Martyn, 1998; van Rooyen, Godlee, Evans, Black, & Smith, 1999). If transparency in peer review is the key to tackling the various issues facing the current peer review system, will authors and reviewers embrace OPR?

Launched in 2001, the journal *Atmospheric Chemistry and Physics*, was the among the first open access OPR journals (Pöschl & Koop, 2008), along with 36 journals published by BioMed Central (https://www.biomedcentral.com/journals-a-z). Since then, a small number of studies

have investigated author and reviewer attitudes towards OPR, characteristics of open reviews and methods of OPR adoption by existing and new journals.

In a large-scale international study of researchers' attitudes towards peer review, Mulligan, Hall, and Raphael (2013) found that only 20% of the respondents were in favour of making the identity of the reviewers known to authors of the reviewed manuscripts; 25% of the respondents were in favour of publishing signed review reports. In 2016, the OpenAIRE consortium conducted a survey of OPR perceptions and attitudes by inviting respondent participation through social media, distribution lists, and publishers' newsletters. Of the valid 3,062 responses, 76% of the respondents reported having taken part in an OPR process as an author, reviewer, or editor. The survey results show that the respondents are more willing to support open reports (59%) than open identity (31%). The majority of the respondents (74%) believe that the reviewers should be given the option to make their identities open. (Ross-Hellauer, Deppe & Schmidt, 2017) Another survey of European researchers conducted by the European Union's OpenUP Project in 2017 received 976 valid responses. The results of this survey also show that the respondents support open reports (39%) more than open identities (29%). This survey also reports a gender difference in supporting open identities (i.e., 35% female researchers versus 26% male researchers) (Görögh, Schmidt, Banelytė, Stanciauskas & Woutersen-Windhouwer, 2017).

In 2012, Elsevier began a pilot project to examine open review on selected trial journals (Mehmani & van Rossum, 2015). A survey of editors, authors and reviewers of the five participating trial journals was conducted in 2015 to assess the impact of open review (Mehmani, 2016). There were encouraging results. Forty-five percent of the reviewers revealed their identity. The majority of the reviewers (95%) commented that publishing review reports had no influence on their recommendations. Furthermore, 33% of the editors identified overall improvement in the review quality and 70% of these editors said that the open review reports were more in depth and constructive. Only a small fraction of the authors indicated that they would prefer not to publish in open review journals. Mehmani reported high usage of review reports by counting the clicks to the review reports, which indicated the value of open review to the readers. Some of the findings from Elsevier's pilot project corroborate other published studies on the characteristics of OPR comments and author/reviewer. Bornmann, Wolf, and Daniel (2012) compared the reviewer comments of a closed peer review journal and an open peer review journal. They found that the reviewer comments in the open review journal were significantly longer than the reviewer comments in the closed review journal. Wang, You, Rath, and Wolfram (2016) analysed the optional OPR journal *PeerJ*'s publicly available reports for the first three years of the journal (2013-2016). They found that the majority of the papers (74%) published during this time had peer review histories alongside the articles; of the published review reports, 43% included the reviewers' identities.

Vrana (2017) collected data from the websites of the top 100 scientific publishers to identify if the publishers have adopted and implemented OPR. Vrana found only nine OPR publishers, of which six listed 12 OPR journal titles. Wang and Tahamtan (2017) searched the Directory of Open Access Journals (https://doaj.com) and followed the literature and publishers of known OPR journals. They identified 155 OPR journals, of which the majority were in medicine and related fields. They also found the various characteristics in the implementations by the OPR journals.

At the 2016 Annual Meeting of the Association for Information Science and Technology, a panel of well-known scientists and editors engaged in a conversation and debate with conference attendees on the emerging open peer review innovation in the era of open science (Wang & Wolfram, 2016). Similarly, at the 8th Peer Review Congress (2017), leaders in academic publishing held a panel on "Transparency in Peer Review." The panellists discussed the various shades or spectrum of transparency in open peer review practices. Also touched

upon was the lack of transparency in research proposal reviews, especially for private foundations. Attendees at the Congress raised another important question: should there also be transparency to review reports of rejected manuscripts if they are a part of the scholarly ecosystem?

Despite the growing interest in OPR, there still is no uniform definition of OPR or generally agreed upon best implementation model. Ford (2013) reviewed the literature on the topic to define and characterize OPR. Acknowledging the diverse views of OPR, she defined OPR as "the process incorporates disclosure of authors' and reviewers' identities at some point during an article's review and publication" (p. 314). She further characterized OPR by *openness* (i.e., signed review, disclosed review, editor-mediated review, transparent review, and crowd-sourced/public review), and *timing* (pre-publication, synchronous, and post-publication). Fresco-Santalla and Hernandez-Perez (2014) illustrated how OPR has been manifested by different journals: open reviews (for all or specific papers), signed reviews (obligatory, pre- or post- publication), readership access to review reports (required or optional), readership commenting (pre- or post- publication). According to Tattersall (2015), there were ten leading OPR platforms.

Ross-Hellauer (2017) conducted a systematic literature review and identified seven elements based on 22 definitions. They defined two core elements of OPR focusing on *open identities* and *open reports*. The other five elements in the order of frequency of occurrences include *open participation*, *open interaction*, *open pre-review manuscripts*, *open final-version commenting*, and *open platforms/decoupled review*. These elements formed a framework for two surveys conducted by OpenAIRE (Ross-Hellauer, Deppe & Schmidt, 2017) and OpenUP (Görögh, Schmidt, Banelytė, Stanciauskas & Woutersen-Windhouwer, 2017). Similarly, Tennant et al. (2017) provided a comprehensive review of journals' peer review practices from the past to the present, which they published in the OPR journal *F1000Research*. Taking a much broader perspective, they examined pros and cons of open reviews including public commentary and staged publishing.

Another related development that provides credit for peer reviewers that may also have an impact on OPR adoption are services that encourage researchers to archive their peer review reports in scholarly repositories or networks such as Publons (https://publons.com/). Publons does an excellent job of authenticating review claims, but the majority of the verified reviews are not accessible due to required permissions by the journals.

Will OPR become a mainstream scholarly practice similar to open access and open data in open science? Further research is needed to understand the concept of OPR and its diverse implementations by publishers as well as the perceptions and attitudes of scientists as authors and reviewers. The purpose of this study is to conduct a thorough search for and analysis of current OPR journals to address the following research questions:

1. What is the current state of OPR?
2. What has been the trend for OPR adoption?
3. Who are the early adopters of OPR?
    a. Which disciplines have adopted OPR?
    b. Which publishers are the front runners or leaders in OPR adoption?
4. What are the emerging OPR model implementations? More specifically, what are the decision factors influencing open identities and open reports?

This study serves as the first stage of a two-phase investigation examining the current state and characteristics of OPR.

Method

As there is no comprehensive list of current OPR journals, relevant journals were identified using multiple search strategies. The Directory of Open Access Journals (DOAJ) indexes more

than 12,000 open access journals and identifies the peer review process of the journals it indexes. A search was conducted for journals identified as "open peer review." This list served as the core of the studied journals. A broader Internet search using the terms "open peer review" and "journal" was conducted using Google to identify additional titles. A third strategy was to review the literature for studies of OPR journals that were not included in DOAJ or the broader search, and by using a snowball searching technique on publisher websites to identify additional titles not found by the other approaches. In order to qualify for consideration, journals had to demonstrate adherence to at least one of two core OPR elements identified by Ross-Hellauer (2017): *open identities*, where reviewer names were made public and/or *open reports*, where the original reviews or summaries of the reviews were publicly available.

Journal data were initially collected during the summer of 2018 and updated up to December 2018. In defining the scope of OPR, we did not include journals that were limited to post-publication peer review, as these contributions may take the form of reader comments appearing after the article on the journal website. As a result of our initial searches, we found more than 230 journals. Several of the identified journal had discontinued publication and were removed from further consideration. Some journals (e.g., *BMJ Pediatrics Open* and several journals published by Copernicus Publications) indicated in their editorial policy that they follow OPR. However, if there was no evidence to support OPR (e.g., open reports or reviewer identities) in the published articles, these journals were also excluded. This exclusion extended to journals where reviewers were made known to manuscript authors during the review process but were not included in the final published version, thereby remaining hidden to readers. Some DOAJ entries for journals were blogs rather than venues for the publication of research and were also excluded. This study did not include journals that implemented only one of the following OPR elements defined by Ross-Hellauer (2017): open participation, open interaction, open pre-review manuscripts, open final-version commenting, and open platforms/decoupled review. The final list consisted of 174 OPR journals (see Appendix). Journals with asterisks represent the earliest adopters that began OPR adoption in 2001.

The DOAJ-listed information and the journal peer review policy on each journal's website were analysed to determine the accuracy of DOAJ-provided information and the extent of OPR use. Journal data were stored in an Excel spreadsheet and analysed using cross-tabulations and qualitative assessment of relevant journal content. Stored information included: journal metadata, year of first OPR use, publisher name, publisher country, policy for reviewer identity, policy for report availability, reviewer selection policy, OPR options for authors, OPR options for reviewers, report availability (what is available, when, where) and high-level journal discipline.

Results

Descriptive Data

The growth of OPR adoption—measured either by existing or new journals—is summarized in Figure 1 by broad discipline. The journals were classified into five broad topical areas using a modified form of the DOAJ classification scheme to determine which disciplinary areas have adopted OPR. Most journals did not report when they adopted OPR or if they have always used OPR. First OPR usage was confirmed by searching early issues of the journals to identify when OPR practices began. In many cases, OPR adoption coincided with the first journal issue.

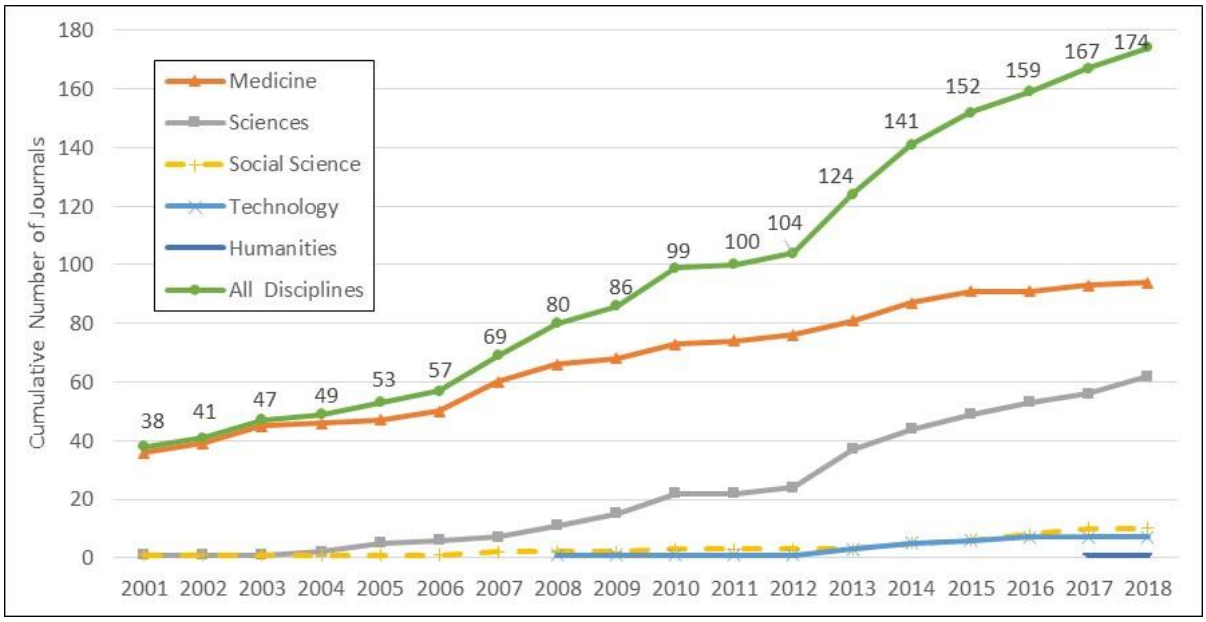

Figure 1. Growth of OPR journals by discipline groups

The early adopters of OPR can be traced back to the beginning of the 2000s. The journals *Atmospheric Chemistry and Physics* and *European Cells & Materials* each implemented a different OPR model, although both launched their first issues in 2001. Similarly, 36 OPR journals published by BioMed Central implemented another model in the same year (See the appendix for the first 38 OPR journals). Since then, there has been steady growth in the number of journals that have adopted OPR, most noticeably in medicine and, more recently, in the natural sciences over the past 10 years. The disciplinary distribution of OPR journals appears in Table 1. For each discipline group, its first OPR year and number of articles suggest how OPR as an innovation is being adopted. Medicine had the most early adopters.

Table 1. Adoption of OPR by discipline group over time

Discipline Group	*Year of First OPR Journal*	*# of OPR Journals in First Year*	*Total*	*Percentage of all OPR Journals*
Medicine	2001	36	94	54.0%
Natural Sciences	2001	1	62	35.6%
Social Sciences	2001	1	10	5.7%
Technology	2008	1	7	4.0%
Humanities	2017	1	1	0.6%
Total			174	99.9%

A summary of the most prolific OPR contributing publishers and their headquarters country appears in Table 2. Although many journals today attract an international audience and are managed by international teams of researchers, the prevalence of OPR journals associated with publishers based in Europe stands out. Of note, 87% of the OPR journals are published by three publishers (BioMed Central, Frontiers, Copernicus Publications). This points to the important role that publishers have played to date in the promotion of OPR. The 'All other publishers' category, with only one journal each, shows narrow geographic representation across 7 countries, 5 of which are also in Europe. This also points to the leading role of European publishers in this effort. All but four of the 174 OPR journals were associated with publishers based in Europe.

Table 2. Adoption of OPR by publishers

Publisher	*OPR Journals*	*OPR Articles*	*Total Journals*	*Percentage of OPR Journals*	*Headquarters Location*
BioMed Central (Springer)	68	65,771	330	20.6%	United Kingdom
Frontiers	64	95,533	64	100.0%	Switzerland
Copernicus Publications	20	39,628	38	52.6%	Germany
Elsevier	5	358	2,960	0.2%	Netherlands
F1000 Research Ltd	2	3,273	2	100%	United Kingdom
Other publishers (15)	15	7,663	--	--%	(7 countries)*
Total	174	212,226			

*Argentina (1), Bulgaria (1), Netherlands (1), Germany (1), Switzerland (1), United Kingdom (7), United States (3)

OPR in Current Practice

A fundamental principle of OPR is transparency. This includes open identities and/or open reports. Publishers and editors of journals adopted different levels of transparency, where one or both of the transparency elements may be optional or required. Table 3 reports the adoption of open reports based on the broad discipline of the journals. Approximately 63% (110/174) of the journals require or make open reports optional. The percentage is highest in medicine, and second highest in the social sciences. However, the small number of journals in social sciences means that a single journal can greatly influence the outcome. Open reports are much lower for technology and the humanities. The availability of open identities, on the other hand, was much more common. All 174 journals, except for one in the social sciences, permitted or required reviewers to identify themselves.

Table 3. Number of OPR journals adopted open reports by discipline group

Open reports / Discipline	*Available*	*OPR Journals*	*Percentage*
Medicine	69	94	73.4%
Social Sciences	6	10	60.0%
Natural Sciences	33	62	53.2%
Technology	2	7	28.6%
Humanities	0	1	0.0%
Total	110	174	63.2%

Open identities may be mandated, optional or anonymous. Similarly, open reports may be mandated, optional or not available. The frequency of each combination along with an example journal appear in Table 4. When reviewers remain anonymous and their reports are not made available, this is traditional blind peer review (the upper left cell). No examples could be found of journals that provide: 1) reviewers the option to identify themselves without making the reports available, 2) anonymous reports with optional report availability, or 3) mandated open identity with optional report availability. Examples could be found for each of the remaining categories with widely varying frequencies of implementation. The adoption of mandated open identities (141/174 or 81%) was more common than mandated open reports (107/174 or 61.5%). Fewer than half of the journals studied (77/174 or 44.3%) required that both open identities and open reports be included. Only three journals provided reviewers and authors optional open identities and optional open reports. Furthermore, more than a third of the journals (64/174 or 36.8%) published the reviewer names only with no access to the reports. Only one of the OPR journals published open reports without open identities (i.e., *Ledger*).

Table 4. Adoption of open identities and open reports

Open reports \ *Open identities*		*Anonymous*	*Optional*	*Mandated*	*Total*
None	Cases (Example)	—	—	64 (*Frontiers in Big Data*)	64
Optional	Cases (Example)	—	3 (*PeerJ*)	—	3
Mandated	Cases (Example)	1 (*Ledger*)	29 (*eLife*)	77 (*BMC Medicine*)	107
Total		1	32	141	174

Emerging OPR Implementation Models & Their Decision Factors

The current OPR landscape is complex and exhibits a variety of configurations ranging from opening some aspects of the established blind-review process to a fully transparent process. Although there is not a simple way to define the emerging OPR practices, a descriptive framework focusing on how *open identities* and *open reports* are being fulfilled (process) and what end products are available for access as depicted in Figure 2.

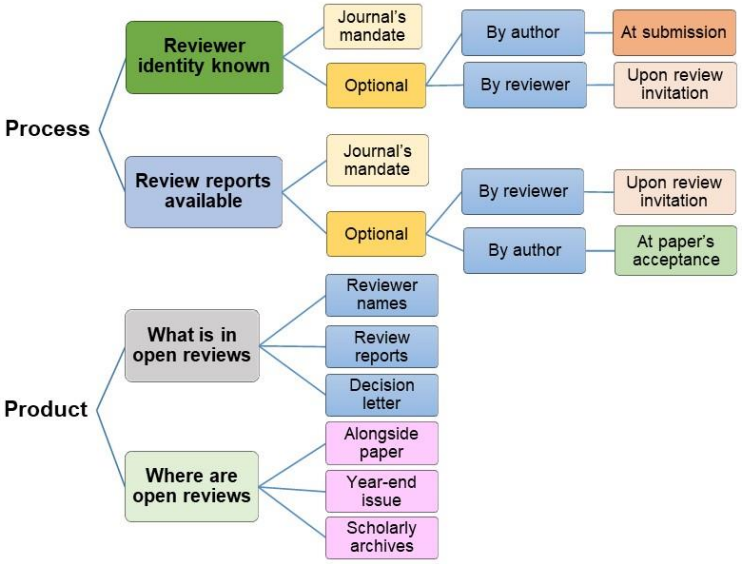

Figure 2. Process-Product Model

From a different view, various implementations models of OPR involve four factors: 1. *who* makes decisions: reviewer, author, and editor/journal; 2. *when* the decision is made for a specific core element: pre-, post, or concurrent process; 3. *what* is contained in open reports: original reports, a consolidated letter, or invited commentaries by reviewers who made significant contributions to the paper's revision; 4. *where* the open reports can be accessed.

These four factors can potentially define the level of transparency which a journal puts into practice of OPR. For example, *F1000Research* is the most transparent OPR journal because its peer review process is totally open; both reviewer identity and review comments are instantly accessible alongside of the manuscript while it is being reviewed and revised. As a contrast, the OPR journals published by Frontiers only publish each paper with its reviewers' names, which is a minimum level of open identity, although reviewers and authors interact with one another during the review process. A proposed implementation scheme, taking into consideration of the four factors, is shown in Figure 3 and illustrated below:

1. ***Who*** decides about …
   a. Open identities
   - ~ Mandated by journal (e.g., *F1000Research*, all Frontiers journals)
   - ~ Reviewers (e.g., *PeerJ*, *eLife*)
   - ~ Both authors and reviewers (e.g., *Papers in Physics*)

   b. Open reports
   - ~ Mandated by journal (e.g., all BMC OPR journals, *F1000Research*)
   - ~ Authors of published papers (e.g., *PeerJ*)
   - ~ Reviewers
   - ~ Editors (e.g., *eLife*)

2. ***When*** a decision is made about …
   a. Open identities
   - ~ At submission (e.g., all Frontiers journals)
   - ~ Upon agreeing to review (e.g., BMC OPR journals, *F1000Research*)
   - ~ Prior to the review process at submission and upon agreeing to review (e.g., *Papers in Physics*)
   - ~ At submission of review report (e.g., *PeerJ*)

   b. Open reports
   - ~ Upon manuscript being accepted for publishing (e.g., *PeerJ*)
   - ~ Upon manuscript being accepted for publishing to selectively invite commentary from reviewers made significant contribution (e.g., *Papers in Physics*)

3. ***What*** is included in the open reviews?
   a. Original timestamped review reports (e.g., all BMC OPR journals, *F1000Research*, *PeerJ*)
   b. Consolidated review reports as decision letters (e.g., *eLife*)
   c. Commentary article by reviewers invited by the editor for significant contributions to the published paper (e.g., *Papers in Physics*)
   d. Names of reviewers acknowledged (e.g., Frontiers journals)

4. ***Where*** are open reports accessible?
   a. Added to the article as a section (e.g., *European Cells & Materials*)
   b. Standalone page or file alongside the publication (e.g., *PeerJ*, *eLife*, all Copernicus OPR journals)
   c. A commentary article in the same issue of the article (e.g., *Papers in Physics*)
   d. A dedicated year-end Supplement issue (e.g., Elsevier's 5 trial journals)
   e. Reviews archived in scholarly network services (e.g., *Publons*)

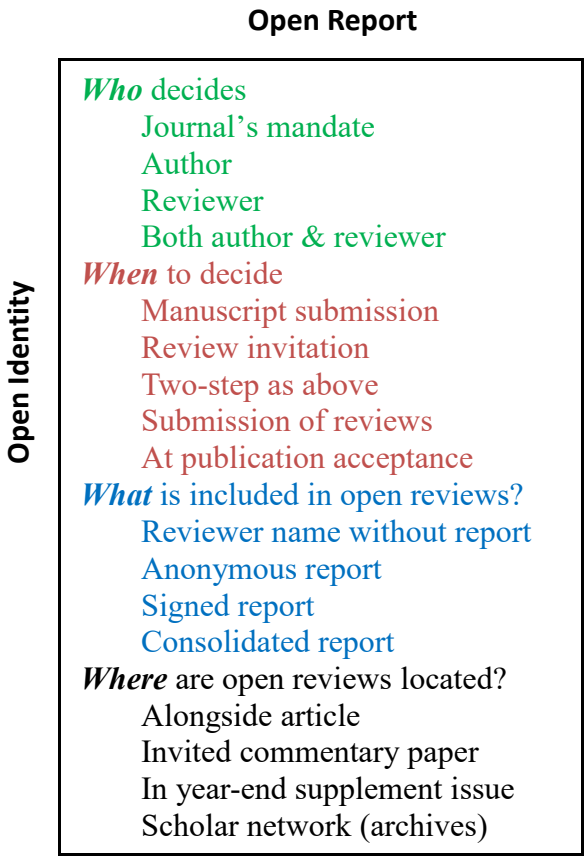

Figure 3. Factors in OPR Implementations

Discussion

This study represents the first comprehensive investigation of the scope and depth of OPR adoption in the open science era. Since the *BMJ* experiments with open reviews more than 20 years ago, the adoption of OPR has gone from 38 journals in 2001, to at least 174 journals by the end of 2018. Figure 1 demonstrates that there has been steady growth in the number of OPR journals over time, led by journals in medicine and the natural sciences. The remaining disciplines have been much slower and later to adopt OPR, especially the humanities. The

humanities have different scholarship cultures as compared to the natural sciences and have been slow in adopting open access (Eve, 2017; Gross and Ryan, 2015).

Several publishers have served as pioneers and early adopters of OPR. The three most prolific publishers of OPR journals that have led the way--BioMed Central, Frontiers, and Copernicus Publications--have each adopted different approaches. BioMed Central, as the leading OPR journal publisher in this study, began the practice early with dozens of journals, opting for both open reports and open identities. The publishers of 170 out of the 174 OPR journals in this study are based in Europe, signifying Europe's leading role in the OPR movement. The European scientific communities have been strong innovators in open science, so it is no surprise that European publishers would be innovators and early adopters in OPR. Three of the remaining journals are associated with publishers in the United States and one is published in Argentina. This strong European effort is also seen in the larger open science movement, where organizations such as OpenAIRE and OpenUP are investigating all aspects of this movement, including OPR.

Multiple OPR models emerge from the analysis of the data that show different levels of transparency in implementation. The level of transparency can be characterized along a continuum; a scoring algorithm is being developed and tested to compare different models using the process-product model incorporating the four factors (open identity, open report, what included, where to access) and process and product. The most transparent model is the concurrent open review process exemplified by *F1000Research*, where reviewers' identities and reports are instantly available alongside manuscripts and are published upon submission following initial format checking. Another model that promotes total transparency, exemplified by many BioMed Central journals, provides access to the complete report history and author exchanges as well as open identities alongside the published articles. The next several models that allow authors and/or reviewers to participate in open review decisions during the process include: mandated open reports but optional open identities (e.g., *eLife*), mandated open reports without open identities (e.g., *Ledger*), and optional open reports with optional open identities (e.g., *PeerJ*). The least transparent model, used by the Frontiers journals, is a closed review process with the published articles including only the names of the reviewers.

Conclusion

The adoption of OPR innovation is growing. This growth has been largely spurred by three publishers based in Europe. To date, OPR has been adopted mostly by journals in medicine and the natural sciences, although the number of OPR journals remains a very small percentage of scholarly journals, overall. The fact that there are multiple approaches to the adoption of OPR indicates there is no consensus at present regarding best practices. The gold standard for OPR transparency includes open identities along with open reports, but few OPR journals have adopted complete transparency.

Limitations of the present research must be recognized. Currently, there is no universal way to identify journals that adopt OPR models. Our approach was to cast a broad net using multiple sources to identify candidate journals. It is possible that we have missed OPR journals that are not indexed by sources such as DOAJ or the search services used. Like any indexing source, there may also be a regional or language bias. Also, the coverage of multidisciplinary journals may span more than one of the identified disciplines. These journals were categorized into the most relevant discipline.

The next phase of this research, currently underway, is analysing the contents of open reports under different models using text mining and natural language processing techniques to determine if the referee comments and quality differ under different models that support open reports and open identities.

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Appendix – OPR Journals

'*' indicates an early OPR adopter from 2001

Biomed Central

Archives of Public Health; BioData Mining; Biology Direct; BMC Anesthesiology; BMC Cancer*; BMC Cardiovascular Disorders*; BMC Clinical Pathology*; BMC Complementary and Alternative Medicine*; BMC Dermatology*; BMC Ear, Nose and Throat Disorders*; BMC Emergency Medicine*; BMC Endocrine Disorders*; BMC Family Practice*; BMC Gastroenterology*; BMC Geriatrics*; BMC Health Services Research*; BMC Hematology** (prev. *BMC Blood Disorders*)*; BMC Infectious Diseases*; BMC International Health and Human Rights*; BMC Medical Education*; BMC Medical Ethics*; BMC Medical Genetics*; BMC Medical Genomics*; BMC Medical Imaging*; BMC Medical Informatics and Decision Making*; BMC Medical Research Methodology*; BMC Medicine; BMC Musculoskeletal Disorders*; BMC Nephrology*; BMC Neurology*; BMC Nursing*; BMC Nutrition; BMC Obesity; BMC Ophthalmology*; BMC Oral Health*; BMC Palliative Care*; BMC Pediatrics*; BMC Pharmacology and Toxicology; BMC Pregnancy and Childbirth*; BMC Psychiatry*; BMC Psychology; BMC Public Health*; BMC Pulmonary Medicine*; BMC Rheumatology; BMC Sports Science, Medicine and Rehabilitation; BMC Surgery*; BMC Urology*; BMC Women's Health*; Cardiovascular Ultrasound; Diagnostic and Prognostic Research; Environmental Health; Head & Face Medicine; Health Research Policy and Systems; Hereditary Cancer in Clinical Practice; Human Resources for Health; Implementation Science; Journal of Cardiothoracic Surgery; Journal of Foot and Ankle Research; Journal of Medical Case Reports; Nutrition Journal; Pilot and Feasibility Studies; Population Health Metrics; Reproductive Health; Research Integrity and Peer Review; Research*

Involvement and Engagement; Scoliosis and Spinal Disorders (prev. *Scoliosis); Systematic Reviews; Trials*

Copernicus Publications
Annales Geophysicae; Atmospheric Chemistry and Physics; Atmospheric Measurement Techniques; Biogeosciences; Climate of the Past; Drinking Water Engineering and Science; Earth Surface Dynamics; Earth System Dynamics; Earth System Science Data (ESSD); Geoscience Communication; Geoscientific Instrumentation, Methods and Data System; Geoscientific Model Development; Hydrology and Earth System Sciences; Natural Hazards and Earth System Sciences; Nonlinear Processes in Geophysics; Ocean Science; SOIL; Solid Earth; The Cryosphere; Wind Energy Science*

Elsevier
Agricultural and Forest Meteorology; Annals of medicine and surgery; Engineering Fracture Mechanics; International Journal of Surgery; Journal of Hydrology: Regional Studies

Frontiers
Frontiers for Young Minds; Frontiers in Aging Neuroscience; Frontiers in Applied Mathematics and Statistics; Frontiers in Artificial Intelligence; Frontiers in Astronomy and Space Sciences; Frontiers in Behavioral Neuroscience; Frontiers in Big Data; Frontiers in Bioengineering and Biotechnology; Frontiers in Blockchain; Frontiers in Built Environment; Frontiers in Cardiovascular Medicine; Frontiers in Cell and Developmental Biology; Frontiers in Cellular and Infection Microbiology; Frontiers in Cellular Neuroscience; Frontiers in Chemistry; Frontiers in Communication; Frontiers in Computational Neuroscience; Frontiers in Digital Humanities; Frontiers in Earth Science; Frontiers in Ecology and Evolution; Frontiers in Education; Frontiers in Endocrinology; Frontiers in Energy Research; Frontiers in Environmental Science; Frontiers in Evolutionary Neuroscience; Frontiers in Forests and Global Change; Frontiers in Genetics; Frontiers in Human Neuroscience; Frontiers in ICT; Frontiers in Immunology; Frontiers in Integrative Neuroscience; Frontiers in Marine Science; Frontiers in Materials; Frontiers in Mechanical Engineering; Frontiers in Medicine; Frontiers in Microbiology; Frontiers in Molecular Biosciences; Frontiers in Molecular Neuroscience; Frontiers in Neural Circuits; Frontiers in Neuroanatomy; Frontiers in Neuroenergetics; Frontiers in Neuroengineering; Frontiers in Neuroinformatics; Frontiers in Neurology; Frontiers in Neurorobotics; Frontiers in Neuroscience; Frontiers in Nutrition; Frontiers in Oncology; Frontiers in Pediatrics; Frontiers in Pharmacology; Frontiers in Physics; Frontiers in Physiology; Frontiers in Plant Science; Frontiers in Psychiatry; Frontiers in Psychology; Frontiers in Public Health; Frontiers in Research Metrics and Analytics; Frontiers in Robotics and AI; Frontiers in Sociology; Frontiers in Surgery; Frontiers in Sustainable Food Systems; Frontiers in Synaptic Neuroscience; Frontiers in Systems Neuroscience; Frontiers in Veterinary Science

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