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Preprint policies among 14 academic publishers

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ABSTRACT

The objective of this study was to assess how 14 large and established scientific publishers have adopted the use of preprints and how their policies changed in a one-year period between June 2017 and June 2018, if any. The core search was performed using the Sherpa/RoMEO database. Of all publishers (2516, now 2553) listed in the RoMEO database, 80.3% of the publishers examined allow self-archiving, but only half of the publishers (47.3%) allow the archiving of preprints in February of 2018, while this percentage increased to 48% in June 2018. These data were practically constant over a one-year period even as the number of preprint servers has increased. Several exceptions exist among journals within each of the tested Sherpa/RoMEO-indexed publishers, and in some cases, a reversal in policy was observed, i.e., from allowing to no longer allowing the archival of preprints.

The state of preprints in a nut-shell: advances and challenges

The use of preprints – non-peer reviewed documents – is increasing in the biological sciences (Berg, 2017; Kaiser, 2017; Maslove, 2018) and will soon begin to make inroads in medical science. Spurred by a "fake science" crisis (Teixeira da Silva, 2017a), lack of reproducibility (Wicherts, 2017), and an extremely slow peer review process during traditional peer review (Teixeira da Silva & Dobránszki, 2017a), preprints are to some extent an expression of the failure of traditional biomedical publishing, and a response to this failure. Thus, preprints have been marketed as a solution to the replication crisis (Berg et al., 2016) and thus serve as a replication-fixing tool by allowing biologists to challenge published results (Callaway, 2017a), and prove their lack of reproducibility, or fortify and confirm their reproducibility, by presenting contrary or confirmatory data. Preprints also represent a rapid way to present research findings to the public, discussion among colleagues on early findings, communication with colleagues and potential peers on improving possibilities of a manuscript, offering early career scientists a way to showcase their work early to the public, which could have a positive effect on job opportunities or funding (Berg, 2017; Bove-Fenderson, Duffy, & Mannstadt, 2018; Desjardins-Proulx et al., 2013; Maslove, 2018; Verma, 2017). For academics fearing that their results have been scooped, the Public Library of Science (PLOS) introduced the concept of "complementary research" in *PLOS Biology*, allowing academics to present their findings as a preprint, thereby extending the findings of the "original" article.[1] Posting of preprints has been allowed from May 1, 2018 to all PLOS journals.[2]

Preprints also allow funders to see their investment in research on display early, as proof of their investment, and some funding agencies have gone as far as to establish their own preprint servers exclusively for the researchers that they fund, such as Wellcome Trust's Wellcome Open Research.[3] Philanthropic groups are investing in preprint servers and in the future of preprints such as the Chan Zuckerberg Initiative, which funds *bioRxiv*, which is hosted, owned and run by Cold Spring Harbor Laboratory[4] (Callaway, 2017b), or the Alfred P. Sloan Foundation, which funds arXiv.[5] Finally, there is a group promoting the wider use of preprints, namely ASAPbio.[6] The Center for Open Science, as part of the Open Science Framework (OSF), which also receives philanthropic funding, hosts a number of preprint servers.[7] Funded by some philanthropic groups, the OSF views preprints as one way to

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[1] http://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.2005203.
[2] http://blogs.plos.org/plos/2018/04/one-small-step-for-preprints-one-giant-step-forward-for-open-scientific-communications/.
[3] https://wellcomeopenresearch.org/.
[4] https://www.cshl.edu/cold-spring-harbor-laboratory-boost-sharing-global-scientific-research-collaboration-chan-zuckerberg-initiative/.
[5] https://www.library.cornell.edu/about/news/archive/alfred-p-sloan-foundation-awards-grant-arxiv-upgrade.
[6] http://asapbio.org/.
[7] https://osf.io/preprints/.

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improve the replication crisis in cancer biology,[8,9] a notion supported by PLOS. Preprint territories are thus being demarcated, for now restricted primarily to themes, such as biology, psychology, engineering or other broad fields, but at some point, competing preprint servers may begin to encroach upon each other's territories, or compete, eventually leading to friction, inducing what was dubbed by Teixeira da Silva (2017b) as the "preprint wars". This territoriality has already become evident as PLOS supports *bioRxiv* while *The Lancet* has decided to establish a six-month trial with SSRN (Kleinert & Horton, 2018), a preprint platform that is owned by Elsevier since 2016, establishing competition in the preprint medical sciences. Since preprints are the logical precursor to peer-reviewed papers, leading either to an increase in volume of subscription journals or open access article processing charges, this increasing territoriality will surely become a new revenue stream in the publishing industry. It is therefore important to appreciate which publishers are receptive to preprints.

There are academics who believe that scientific content that has not been properly vetted by peers should not be cited or used in practice, because it could be equivalent to citing faulty science, or, for those who are invested in theories of the "predatory" publishing movement, such actions could be perceived as supporting and promoting pseudo-science (Teixeira da Silva, 2017c), which is not an unreasonable argument to make given that preprints are generally approved within as little as 24 h, and with only oversight by a handful of "advisors" who crudely approve or disapprove of the content (Teixeira da Silva, 2017d). Although preprint servers have not yet started to charge article processing fees for this form of open access literature, the risk exists (Loew, 2016). New risks have also emerged in preprints apart from their weak scholarly nature, namely unattributed ideas, intellectual phishing, or ghost authorship, hidden or undeclared conflicts of interest, and concealment of data, aspects that are antithetic to the very fundament of the open data movement (Teixeira da Silva, 2017e).

Nowadays, after the extension of preprints in computing, physical and mathematical sciences, the need for and use of preprints in biomedical sciences has also been increasing (Kaiser, 2017; Maslove, 2018). However, mainly in clinical research, publicizing the results of very early and non-peer-reviewed, and thus potentially unfounded or preliminary findings, may be a source of danger to society (Maslove, 2018). So, the debate surrounding preprints is not simply a hot topic, or publishing's latest trend, it is a form of publication with real ethical and academic dilemmas that will affect the scholarly nature of the published literature as preprints gain traction, and as they start to become metricized (Teixeira da Silva, 2018).

Another development, namely the assignment of superficial badges to preprints, and the ability to transfer papers to preprint servers after they have been submitted to a journal, as now occurs with the PLOS and *bioRxiv* deal,[10] has added new concerns to preprints and their potential abuse. Such actions suggest that publishers and/or preprint servers are either trying to advance in the "preprint wars" by offering novelties that their competitors do not have, to guarantee intellectual investment in a journal or publisher by reversing the logical reason for the existence of preprints, namely to present data in a crude form to the public *prior* to submission to a journal, or to offer semantic rewards in order to diversify the market and add a "branding value" to preprints, i.e., making preprints a commodity that can be abused like so many other aspects in commercial academic publishing today.

Given this increasing use of preprints, the objective of this study was to use the Sherpa/RoMEO database,[11] which offers a summary of the preprint policies of publishers it indexes, to assess how 14 scientific publishers (Table 1) use or allow the use of preprints during their publishing process. The selection of these publishers was a continuity of a discussion of these publishers related to authorship policies (Teixeira da Silva & Dobránszki, 2016) and ethics policies related to retractions (Teixeira da Silva & Dobránszki, 2017b). The database was assessed in June 2017 and then again in February and June 2018 in order to observe if policy statements and acceptance values have changed over a one-year period. The archiving policy of each publisher is indicated by different colours by RoMEO, either as green when both pre- and post-print archiving are allowed, blue for post-prints only, yellow for pre-print archival, or white if archiving either preprints or post-prints is not supported.[12]

Which mainstream publishers allow the use of preprints and what policies do they have?

We discovered that the scientific publishers listed in Table 1 are either RoMEO green (8 in total; 57.1%) or RoMEO yellow (6 in total; 42.9%) publishers, i.e., all of them support preprints or preprint servers. Five publishers (De Gruyter, Emerald, Hindawi, Inderscience, and SAGE), indicated as either RoMEO green or yellow publishers, did not have special written preprint policies, but two of them (Hindawi and SAGE) already had supporting statements for preprints on their websites in 2017. Inderscience allows the use of preprints (a non-peer-reviewed manuscript) for different non-commercial sites with some restrictions.[13] A similar regulation exists at Bentham, with an unchanged additional 12-month embargo period. Some Emerald, Elsevier and OUP journals may have special or alternative policies for preprints that are different from the default regulations of the publisher and can even exclude preprint archiving, i.e., preprints are not supported at all (RoMEO white), for example, *Methods in Cell Biology*,[14] or *Methods in Enzymology*,[15] both published by Elsevier. The other eight listed STEM publishers have defined policies for self-archiving, sharing or a special policy for preprints and preprint servers. PLoS further encourages preprint sharing and use by enabling direct submission of a manuscript from *bioRxiv* to select PLoS journals.[16]

We assessed the same preprint policies again in February 2018 and found that De Gruyter had a repository policy but no special policy for preprints. SAGE claims that posting preprint servers is possible before submission but that the editor should be alerted at the time of submission, although some individual journals may not consider a paper if it was posted on a preprint server.[17] Emerald introduced its preprint policy in 2018. NPG introduced a self-archiving policy and supports the posting of preprints, i.e., "is not considered prior publication" and clearly describes how preprints may be cited. For the other nine publishers listed in Table 1 (Elsevier, Hindawi, IEEE, Inderscience, PLoS, OUP, Springer, Taylor & Francis, Wiley), the preprint policies did not change between mid-2017 and early 2018, although some did provide a more detailed description about preprints and self-archiving, e.g., Inderscience and Springer, suggesting that policies are actively evolving.

[8] https://osf.io/e81xl/.

[9] https://www.wired.com/2017/01/fighting-cancers-crisis-confidence-one-study-time/; https://elifesciences.org/articles/23693.

[10] https://scholarlykitchen.sspnet.org/2018/02/14/badges-we-dont-need-no-stinking-preprint-badges/.

[11] http://www.sherpa.ac.uk/romeo/index.php.

[12] http://www.sherpa.ac.uk/romeo/definitions.php?la=en&fIDnum=|&mode=simple&version=#colours ("green: can archive pre-print *and* post-print or publisher's version/PDF; blue: can archive post-print (ie final draft post-refereeing) or publisher's version/PDF; yellow: can archive pre-print (ie pre-refereeing); white: archiving not formally supported").

[13] Inderscience allows the posting of preprints to a preprint server after publication, a condition that is explicitly prohibited by most preprint servers, such as *bioRxiv*.

[14] https://www.elsevier.com/books/book-series/methods-in-cell-biology.

[15] https://www.elsevier.com/books/book-series/methods-in-enzymology.

[16] http://blogs.plos.org/plos/2018/02/plos-cold-spring-harbor-preprint-agreement-biorxiv/.

[17] Given this inconsistency in policies, we are unsure how SAGE could be considered a "green publisher" by Sherpa/RoMEO.

Table 1
Statements and/or policies for posting preprints in 14 science, technology, engineering and medicine (STEM) publishers.

Publisher	Relevant statements in posting papers on preprint servers	Policy	RoMEO colour[a]
Bentham Science Publishers[c]	"By signing the Copyright Letter the authors retain the rights of self-archiving. Following are the important features of self-archiving policy of *Bentham Science* journals: 1. Authors can deposit the first draft of a submitted article on their personal websites, their institution's repositories or any non-commercial repository for personal use, internal institutional use or for permitted scholarly posting. 2. Authors may deposit the ACCEPTED VERSION of the peer-reviewed article on their personal websites, their institution's repository or any non-commercial repository such as PMC, arXiv after 12 MONTHS of publication on the journal website. In addition, an acknowledgement must be given to the original source of publication and a link should be inserted to the published article on the journal's/publisher's website. 3. If the research is funded by NIH, Wellcome Trust or any other Open Access Mandate, authors are allowed the archiving of published version of manuscripts in an institutional repository after the mandatory embargo period. Authors should first contact the Editorial Office of the journal for information about depositing a copy of the manuscript to a repository. Consistent with the copyright agreement, *Bentham Science* does not allow archiving of FINAL PUBLISHED VERSION of manuscripts. 4. The link to the original source of publication should be provided by inserting the DOI number of the article in the following sentence: "The published manuscript is available at EurekaSelect via http://www.eurekaselect.com/openurl/content.php?genre=article&doi= [insert DOI]." 5. There is no embargo on the archiving of articles published under the OPEN ACCESS PLUS category. Authors are allowed deposition of such articles on institutional, non-commercial repositories and personal websites immediately after publication on the journal website."	Self-archiving policy	Yellow
De Gruyter[d]	No special policy for preprints For repository: "REPOSITORY POLICY In keeping with our efforts in support of the dissemination of research results, De Gruyter is pleased to announce its repository policy, under which the following conditions apply to authors of articles published in multi-authored works (journals, anthologies, edited volumes and databases): AUTHOR WISHES TO INCLUDE HIS/HER ARTICLE ON A PERSONAL WEBSITE OR IN A REPOSITORY De Gruyter allows authors the use of the final published version of an article (publisher pdf) for self-archiving (author's personal website) and/or archiving in an institutional repository (on a non-profit server) after an embargo period of 12 months after publication. The published source must be acknowledged and a link to the journal home page or articles' DOI must be set. Authors MAY NOT self-archive their articles in public and/or commercial subject based repositories. Note for authors of NIH-funded research De Gruyter acknowledges that the author of an US-agency-funded article retains the right to provide a copy of the final manuscript to agency upon acceptance for publication or thereafter, for public archiving in PubMed Central 12 months after publication. Please note that only the accepted authors' version of the manuscript, not the PDF file of the published article, may be used for NIH archiving."	– Repository policy only	Yellow
Elsevier[e]	"*Preprint* ● Authors can share their preprint anywhere at any time. ● If accepted for publication, we encourage authors to link from the preprint to their formal publication via its Digital Object Identifier (DOI). Millions of researchers have access to the formal publications on ScienceDirect, and so links will help your users to find, access, cite, and use the best available version. ● Authors can update their preprints on arXiv or RePEc with their accepted manuscript. Please note: ● Cell Press, The Lancet, and some society-owned titles have different preprint policies. Information on these is available on the journal homepage. ● Preprints should not be added to or enhanced in any way in order to appear more like, or to substitute for, the final versions of articles." In June 2018: "*Preprint* ● Authors can share their preprint anywhere at any time. ● If accepted for publication, we encourage authors to link from the preprint to their formal publication via its Digital Object Identifier (DOI). Millions of researchers have access to the formal publications on ScienceDirect, and so links will help your users to find, access, cite, and use the best available version. ● Authors can update their preprints on arXiv or RePEc with their accepted manuscript. ● Please note: ● Some society-owned titles and journals that operate double-blind peer review have different preprint policies. Please check the journals Guide for Authors for further information. ● Preprints should not be added to or enhanced in any way in order to appear more like, or to substitute for, the final versions of articles."	Policies/sharing articles/preprints	Green, but individual journals may have special permissions or policies, like blue, yellow or white: http://www.sherpa.ac.uk/romeo/search.php
Emerald[f]	No special policy for preprints (2017) February 2018: "Emerald does not consider the upload of a preprint to a preprint server prior publication, and would not request its removal.	– February 2018: preprint policy	Green, but individual journals may have special permissions or policies

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Table 1 (*continued*)

Publisher	Relevant statements in posting papers on preprint servers	Policy	RoMEO colour[a]
	However, this policy is only applicable if: ● The author declares to the Emerald editor on submission of their article that a preprint is hosted on a preprint server; ● The author has not assigned copyright to the pre-print server. Where possible, Emerald will take steps to minimize the impact upon the anonymity of the double blind peer review, such as asking editors to strike out any reference to a preprint before sending the paper out to review. If the submitted article is accepted for publication, Emerald would expect the preprint to be amended to state 'This is an author-created, un-copyedited version of an article accepted for publication in [insert name of journal]'. Upon publication, the preprint should be amended to include the Digital Object Identifier (DOI) to direct the reader to the version of record, hosted on www.emeraldinsight.com."		
Hindawi[g]	No special policy for preprints but a statement: "Hindawi supports the deposition of manuscripts in preprint servers, and does not consider this to compromise the novelty of the results."	–	Green
IEEE[h]	"E-PRINTS Before submitting an article to an IEEE publication, authors frequently post preprints of their articles to their own Web site, their employer's site, or to another server that invites constructive comment from colleagues and provides a publication time stamp. Upon submission of an article to IEEE, an author is required to transfer copyright in the article to IEEE, and the author must update any previously posted version of the article with a prominently displayed IEEE copyright notice (as shown in 8.1.9.B). Upon publication of an article by IEEE, the author must replace any previously posted electronic versions of the article with either (1) the full citation to the IEEE work with a Digital Object Identifier (DOI), or (2) the accepted version only with the DOI (not the IEEE-published version). IEEE shall make available to each author the preprint version of the article that the author can post and that includes the DOI, IEEE's copyright notice, and a notice indicating that the article has been accepted for publication by IEEE."	Electronic information dissemination policy	Green
Inderscience[i]	No special policy for preprints "Authors can use their Article for non-commercial purposes after publication in these ways: ● Posting the *Author's Original*[a] on the Author's personal or departmental web pages and/or institutional repositories and/or subject repositories without embargo and sharing it as much as desired. For open [freely available] repositories, if the manuscript was funded by either RCUK or the Wellcome Trust, use the CC BY: Creative Commons Attribution-NoDerivs 4.0. Otherwise, follow the licensing restrictions applied to all material copyrighted by Inderscience. ● Posting the *Accepted Manuscript*[a] o on the Author's personal or departmental web pages or social media at any point after publication and/or o on institutional repositories and/or subject repositories subject to an embargo of *6 months* after publication or o on academic social networks subject to an embargo of *6 months* after publication; ● Posting the *Version of Record*[a] to a subject-based repository such as PubMed Central *only* in cases where a funding agency providing the grant for the research on which the Article is based requires this of the Author, upon condition that it shall not be accessible until after six months from Inderscience's publication date. The PDF of the VoR should not be posted anywhere else unless it has been published as Open Access. This also applies to any Author who has published with Inderscience in the past; ● Using the article in further research and in courses that the Author is teaching; ● Incorporating the article content in other works by the Author. In all cases, acknowledgement in the form of a full citation must be given to the journal as the original source of publication, together with a link to the journal webpage and/or DOI as soon as they are available." In June 2018: "Authors can use their article *for non-commercial purposes* after publication in these ways: a. Posting the *Author's Original*[a] on the Author's personal or departmental web pages and/or institutional repositories and/or subject repositories without embargo and sharing it as much as desired. For open [freely available] repositories, if the manuscript was funded by either RCUK or the Wellcome Trust, use the CC BY: Creative Commons Attribution-NoDerivs 4.0. Otherwise, follow the licensing restrictions applied to all material copyrighted by Inderscience; b. *Accepted Manuscript*[a] o Internally sharing the *Accepted Manuscript* within their research collaboration groups only, at any point after publication o Posting the *Accepted Manuscript* on institutional repositories and/or subject repositories, subject to an embargo of *12 months* after publication (Green Open Access) o Posting the *Accepted Manuscript* on academic social networks or social media, subject to an embargo of *24 months* after publication (Green Open Access) Note for authors of articles funded by Research Councils UK (RCUK) and Wellcome Trust and other governmental organisations: If you are required to deposit your accepted manuscript into your institutional repository within 90 days of acceptance and our embargo period is longer than that permitted by your funder, please choose Gold Open Access. If this is not possible for you, please speak to your institution about applying for an exception to HEFCE's Research Excellence Framework policy. c. Posting the *Version of Record*[a] to a subject-based repository such as PubMed Central *only* in cases where a funding agency providing the grant for the research on which the Article is based	–	Yellow

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Table 1 (*continued*)

Publisher	Relevant statements in posting papers on preprint servers	Policy	RoMEO colour[a]
	requires this of the Author, upon condition that it shall not be accessible until after six months from Inderscience's publication date. The PDF of the VoR should not be posted anywhere else unless it has been published as Open Access. This also applies to any Author who has published with Inderscience in the past; d. Using the article in further research and in courses that the Author is teaching; e. Incorporating the article content in other works by the Author. In all cases, acknowledgement in the form of a full citation must be given to the journal as the original source of publication, together with a link to the journal webpage and/or DOI as soon as they are available."		
NPG[j]	2017: "The Nature journals support the posting of submitted manuscripts on community preprint servers such as arXiv and bioRxiv. We do, however, ask you to respect the following summary of our policies: • The original submitted version may be posted at any time. • The accepted version may be posted 6 months after publication. • The published version—copyedited and in Nature journal format—may not be posted on a preprint server or other website. For open access content published under a Creative Commons license, authors can replace the submitted version with the final published version at publication as long as a publication reference and URL to the published version on the journal website are provided."	Pre-publication policy	Yellow
	February 2018: "Contributions being prepared for or submitted to a Nature Research journal can be posted on recognized preprint servers (such as arXiv), and on collaborative websites such as wikis or the author's blog. The website and URL must be identified to the editor in the cover letter accompanying submission of the paper, and the content of the paper must not be advertised to the media by virtue of being on the website or preprint server. Material in a contribution submitted to a Nature Research journal may also have been published as part of a PhD or other academic thesis." "Self-archiving policy *Nature Research's policies are compatible with the vast majority of funders' open access and self-archiving mandates.* More information is available on the SHERPA/ROMEO website. Nature Research actively supports the self-archiving process, and continually works with authors, readers, subscribers and site-license holders to develop its policy. ***Preprints*** Nature Research journals support posting of primary research manuscripts on community preprint servers such as arXiv and bioRxiv. Preprint posting is not considered prior publication and will not jeopardize consideration at Nature Research journals. Preprints will not be considered when determining the conceptual advance provided by a study under consideration at Nature Research. Authors posting preprints are asked to respect our policy on communications with the media (http://www.nature.com/authors/policies/embargo.html). Our policy on posting and citation of preprints of primary research manuscripts is summarized below: • The original submitted version of the manuscript (the version that has not undergone peer review) may be posted at any time. Authors should disclose details of preprint posting, including DOI, upon submission of the manuscript to a Nature Research journal. • For subscription journals, the Author's Accepted Manuscript (authors' accepted version of the manuscript) of the manuscript may only be posted 6 months after the paper is published, consistent with our self-archiving embargo (http://www.nature.com/authors/policies/license.html). Please note that the Author's Accepted Manuscript may not be released under a Creative Commons license. For Nature Research's Terms of Reuse of archived manuscripts please see: http://www.nature.com/authors/policies/license.html#terms • For subscription journals, the published PDF must not be posted on a preprint server or any other website. However, authors are encouraged to obtain a free SharedIt link of their paper, which can be posted online and allows read-only access. SharedIt links can be obtained by submitting the published article DOI at http://authors.springernature.com/share • Preprints may be cited in the reference list as below: babichev, S.A., Ries, J. Lvovsky, A.I. Quantum scissors: teleportation of single-mode optical states by means of a nonlocal single photon. Preprint at http://arXiv.org/quant-ph/0208066 (2002)."	(February 2018) Self-archiving policy	
OUP[k]	"Authors may reuse the AOV [Author's Original Version, i.e. preprint] anywhere at any time, providing that once the article is accepted they provide a statement of acknowledgement, and that once the article has been published this acknowledgement is updated to provide details such as the volume and issue number, the DOI, and a link to the published article on the journal's website: *This article has been accepted for publication in* [Journal Title] *Published by Oxford University Press.*" In June 2018: "*The Author's Original Version (AOV) is defined here as the un-refereed author version of an article completed before submission of the article to the journal. This is sometimes referred to as the "preprint" version. The author accepts full responsibility for the article, and the content and layout is set out by the author.* This includes posting on their own personal websites, institutional or non-commercial subject based repositories, commercial platforms websites or repositories, or social media, provided that, upon acceptance, they acknowledge that the article has been accepted for publication as follows: This article has been accepted for publication in [Journal Title] Published by Oxford University Press. After publication we would also ask authors to update their AOV with the Digital Object Identifier (DOI), and include a link to the Version of Record."	Author self-archiving policy	Yellow, but individual journals may have special permissions or policies

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Table 1 (*continued*)

Publisher	Relevant statements in posting papers on preprint servers	Policy	RoMEO colour[a]
PLoS[l]	"PLOS allows and encourages researchers to share early versions of their original research manuscripts via preprint servers either before or after submission to a PLOS journal. Authors choosing bioRxiv may now concurrently submit directly to select PLOS journals through bioRxiv's direct transfer to journal service. Posting a research article on a preprint server prior to or concurrently with submission to a PLOS journal will not preclude consideration of your manuscript for peer review in any PLOS journal. You are also free to post revisions of your manuscript on a preprint server prior to acceptance. We ask that you include the DOI of your preprint, if available, with your PLOS submission to facilitate linking between the preprint and the accepted peer-reviewed article upon publication.[b] Publication platforms that post your article immediately upon submission and automatically provide post-publication peer review are not preprint servers. When you commit to peer review and publication by submitting your article to either a journal or a publication platform with post-publication peer review, you may not submit it to a PLOS journal while it is under consideration." In June 2018: "Preprints connect you to a global community of researchers and scientists tackling the challenges to which you've dedicated your career. By sharing early, you can accelerate the speed at which science moves forward. Power to the preprint. Authors submitting to PLOS[a] can now choose to seamlessly post manuscripts to BiorXiv. Available for PLOS ONE, PLOS Biology, PLOS Genetics, PLOS Computational Biology, PLOS Neglected Tropical Diseases and PLOS Pathogens."[a]	Ethical Publishing Practice/preprint servers	Green
SAGE[m]	No special policy for preprints but a statement in 2017: "Prior publication of datasets or deposition in a pre-print server do not constitute prior publication. …- You may do whatever you wish with the version of the article you submitted to the journal - version 1." February of 2018: "If material has been previously published it is not generally acceptable for publication in a SAGE journal. However, there are certain circumstances where previously published material can be considered for publication:…… • Working papers or versions of the paper posted on a pre-print server: authors should alert the Editor when submitting their paper if they have posted it on a pre-print server. Authors should not post an updated version of their paper on the pre-print server while it is being peer reviewed for possible publication in the journal. If the article is accepted for publication, the author may re-use their work according to the journal's self-archiving policy: SAGE's standard self-archiving policy can be found on our Author Gateway. Please note that individual journals may not accept for consideration papers that have been posted on pre-print servers. Please check the submission guidelines of the journal you are submitting to and confirm with the Editor or Editorial Office directly. In all cases the author should disclose any prior publication or distribution to the Editor and ensure appropriate attribution to the prior distribution and/or publication of the material."	–	Green
Springer[n]	"Prior versions of the article published on non-commercial pre-print servers like arXiv.org can remain on these servers and/or can be updated with the author's accepted version. The final published version (in PDF or HTML/XML format) cannot be used for this purpose. Acknowledgement needs to be given to the final publication and a link should be inserted to the published article on Springer's website, by inserting the DOI number of the article in the following sentence: "The final publication is available at Springer via http://dx.doi.org/ [insert DOI]" February 2018: "By signing the Copyright Transfer Statement you still retain substantial rights, such as self-archiving: *Author(s) are permitted to self-archive a pre-print and an author's accepted manuscript version of their Article.* *a. a pre-print is the author's version of the Article before peer-review has taken place ("Pre-Print"). Prior to acceptance for publication, Author(s) retain the right to make a Pre-Print of their Article available on any of the following: their own personal, self- maintained website; a legally compliant, non-commercial pre-print server such as but not limited to arXiv and bioRxiv. Once the Article has been published, the Author(s) should update the acknowledgement and provide a link to the definitive version on the publisher's website*: "*This is a pre-print of an article published in [insert journal title]. The final authenticated version is available online at: https://doi.org/ [insert DOI]*". *b. An Author's Accepted Manuscript (AAM) is the version accepted for publication in a journal following peer review but prior to copyediting and typesetting that can be made available under the following conditions:* *a. Author(s) retain the right to make an AAM of their Article available on their own personal, self-maintained website immediately on acceptance,* *b. Author(s) retain the right to make an AAM of their Article available for public release on any of the following 12 months after first publication ("Embargo Period"): their employer's internal website; their institutional and/or funder repositories. AAMs may also be deposited in such repositories immediately on acceptance, provided that they are not made publicly available until after the Embargo Period.* *An acknowledgement in the following form should be included, together with a link to the published version on the publisher's website*: "*This is a post-peer-review, pre-copyedit version of an article published in [insert journal title]. The final authenticated version is available online at: http://dx.doi.org/ [insert DOI]*". When publishing an article in a subscription journal, without open access, authors sign the Copyright Transfer Statement (CTS) which also details Springer's self-archiving policy."	Self-archiving policy	Green
Taylor & Francis[o]	"This is your original manuscript (often called a 'preprint'), and you can share this as much as you like. If you do decide to post it anywhere, including onto an academic networking site, we would recommend you use an amended version of the wording below to encourage usage and citation of your final, published article."	Sharing your work	Green

(*continued on next page*)

Table 1 (*continued*)

Publisher	Relevant statements in posting papers on preprint servers	Policy	RoMEO colour[a]
	"This is your original manuscript (often called a 'preprint'), and you can share this as much as you like. If you do decide to post it anywhere, including on a scholarly collaboration network, we would recommend you use an amended version of the wording below to encourage usage and citation of your final, published article (the Version of Record)."		
Wiley[p]	2017, February 2018: "Authors of articles published in Wiley journals are permitted to self-archive the submitted (preprint) version of the article at any time, and may self-archive the accepted (peer-reviewed) version after an embargo period. Submitted (preprint) Version The submitted version of an article is the author's version that has not been peer-reviewed, nor had any value added to it by Wiley (such as formatting or copy editing). The submitted version may be placed on: • the author's personal website • the author's company/institutional repository or archive • not for profit subject-based preprint servers or repositories Self-archiving of the submitted version is not subject to an embargo period. We recommend including an acknowledgement of acceptance for publication and, following the final publication, authors may wish to include the following notice on the first page: "*This is the pre-peer reviewed version of the following article: [FULL CITE], which has been published in final form at [Link to final article using the DOI]. This article may be used for non-commercial purposes in accordance with Wiley Terms and Conditions for Self-Archiving.*" The version posted may not be updated or replaced with the accepted version (except as provided below) or the final published version (the Version of Record). There is no obligation upon authors to remove preprints posted to not for profit preprint servers prior to submission."	Self-archiving policy	Yellow
	June 2018: "A preprint is a paper that is made available publicly via a community preprint server prior to (or simultaneous with) submission to a journal. Preprint servers, i.e., servers that allow for the posting of papers prior to submission for publication, are becoming more common across a range of disciplines. Wiley believes that in communities where non-commercial preprint servers exist, journals should allow for the submission of manuscripts which have already been made available on such a server. Allowing submission does not, of course, guarantee that an article will be sent out for review; it simply reflects a belief that availability on a preprint server should not be a disqualifier for submission. *Wiley's Preprints Policy statement for subscription/hybrid open access journals* *[Journal] will consider for review articles previously available as preprints on non-commercial servers such as ArXiv, bioRxiv, psyArXiv, SocArXiv, engrXiv,* etc. *Authors may also post the submitted version of a manuscript to non-commercial servers at any time. Authors are requested to update any pre-publication versions with a link to the final published article.* *Wiley's Preprints Policy statement for open access journals* *[Journal] will consider for review articles previously available as preprints on non-commercial servers such as ArXiv, bioRxiv, psyArXiv, SocArXiv, engrXiv,* etc. *Authors are requested to update any pre-publication versions with a link to the final published article. Authors may also post the final published version of the article immediately after publication.* *Licensing implications* Wiley will publish submissions that have previously been assigned CC-BY (-NC/-NC-ND) as preprints. If a preprint has been posted under a CC license, it is still possible to publish in the journal under a standard Copyright Transfer Agreement (CTA) or an Exclusive License Agreement (ELA). Authors should not assign copyright during the preprint process; authors should retain copyright in their work when posting to a preprint server. *Implications for citation practices* Wiley encourages researchers and academics who reference preprints (like other peer reviewed and non-peer reviewed sources) to continue to cite these sources accurately. Researchers can search preprint servers that are easily found using scholarly search engines or that are recognized and well-established such as, arXiv.org, bioRxiv, etc. If a preprint is assigned a DOI, Wiley will assign a new DOI to the accepted article and can optionally link to the preprint. Note that the preprint publisher must link to the published article–this is mandatory and falls on the preprint server, not Wiley. More details are available here. *About this policy* The above sections detail Wiley's general policy for preprint submissions. A number of Wiley journals have set policies independently and authors should refer to the policy on the individual journal pages."	Preprints policy (June 2018)	

[a] http://www.sherpa.ac.uk/romeo/index.php?la=en&fIDnum=|&mode=advanced.

[b] This sentence disappeared from the 2017 policy, in February 2018.

[c] Bentham Science Publishers (2018) http://benthamscience.com/self-archiving-policies-main.php (excluding Bentham Open (2018) https://www.benthamopen.com/self-archiving-policies.php).

[d] De Gruyter (2017) http://degruyteropen.com/you/journal-author/repository-policy/; (2018) https://www.degruyter.com/dg/page/576/repository-policy.

[e] Elsevier (2017/2018) https://www.elsevier.com/about/our-business/policies/sharing.

[f] Emerald (2017) http://www.emeraldgrouppublishing.com/authors/writing/author_rights.htm (2018) http://www.emeraldgrouppublishing.com/authors/writing/originality.htm.

[g] Hindawi (2017/2018) https://about.hindawi.com/editors/handling-a-manuscript/.

[h] IEEE (**2017**/2018) http://www.ieee.org/publications_standards/publications/rights/rights_policies.html.

[i] Inderscience (2017/2018) http://www.inderscience.com/info/inauthors/author_copyright.php#entitlement.

[j] NPG (Nature Publishing Group) (2017/2018) http://www.nature.com/authors/policies/confidentiality.html; about pre-prints (2018): https://www.nature.com/

authors/policies/license.

[k] OUP (Oxford University Press) (2017/2018a, b) https://academic.oup.com/journals/pages/access_purchase/rights_and_permissions/self_archiving_policy_a; https://academic.oup.com/journals/pages/access_purchase/rights_and_permissions/self_archiving_policy_b.

[l] PLoS (February of 2018) http://journals.plos.org/plosone/s/ethical-publishing-practice#loc-preprint-servers; (June 2018) https://www.plos.org/preprints (also read: http://blogs.plos.org/plos/2018/02/plos-cold-spring-harbor-preprint-agreement-biorxiv/).

[m] SAGE (2017) http://insights.sagepub.com/author_resources.php?folder_id=120 (this website no longer exists); (2018): https://uk.sagepub.com/en-gb/eur/prior-publication.

[n] Springer-Nature (2017/2018) https://www.springer.com/gp/open-access/authors-rights/self-archiving-policy/2124.

[o] Taylor and Francis/Informa (Routledge) (2017/2018) http://authorservices.taylorandfrancis.com/sharing-your-work/.

[p] Wiley (2017/February 2018) https://authorservices.wiley.com/author-resources/Journal-Authors/licensing-open-access/open-access/self-archiving.html (June 2018) https://authorservices.wiley.com/author-resources/Journal-Authors/licensing-open-access/open-access/preprints-policy.html.

By June of 2018, no changes in preprint policies of the STEM publishers listed in Table 1 were observed, except for Wiley. Wiley established and made available a preprints policy.[18]

In June of 2017, an analysis of the copyright and self-archiving policies at Sherpa/RoMEO, including those related to preprints, of more than 2300 publishers representing more than 28,000 journals, was made. Considering all publishers (2377) listed in the RoMEO database, 80.14% of the publishers allowed some form of self-archiving, but only half of the publishers (47.5%) allowed the archival of preprints (41.3% green, 32.6% blue, 6.3% yellow, and 19.8% white publishers). Even when publishers with special exceptions or provisional policies exist were excluded,[19] these ratios remained similar (80% and 47% for any form of archival and preprint archival, respectively). The same analysis in Sherpa/RoMEO in February of 2018, gave practically the same results. Considering all publishers (2516) listed in the RoMEO database, 80.3% of the publishers allowed self-archiving, and 47.3% of the publishers allowed the archival of preprints (40.8% green, 33% blue, 6.5% yellow, and 19.7% white publishers). The same analysis was repeated in June of 2018, including 2553 publishers listed in the RoMEO database, revealing similar values for green, blue, yellow and white, as well as the following results: 81% of the publishers' archiving policies allowed some form of self-archiving, and 48% of the publishers allowed the archival of preprints. RoMEO had in each evaluation period about 15% “additional policies for special exceptions (393 in June of 2017; 424 in February of 2018, and 437 in June of 2018)”. It can be concluded that during a one-year period, except for Wiley, no distinct changes could be detected in the archiving policies of the publishers listed in the RoMEO database.

Additional policies, outliers and exceptions

Even if all publishers listed in Table 1 have a RoMEO colour indicating their general archiving policies, there are several journals belonging to each publisher that have special archiving or sharing policies in half of the publishers listed, namely De Gruyter, Elsevier, NPG, OUP, Taylor & Francis, SAGE and Wiley. We considered those exceptions that resulted in a change in special policy of RoMEO colour for that journal relative to that of the publisher (Supplementary Table 1).

Our assessment indicates that the RoMEO colour changed from green to yellow in 38 journals (Cell Press) belonging to Elsevier, in two journals at SAGE and in one Springer Nature journal, but this did not induce a change in preprint archival policy. However, the publisher's RoMEO colour changed from green to blue in one SAGE journal or to white in six Elsevier journals, which resulted in an important and fundamental change, namely a change in preprint archival policy from one that previously supported preprint archival to one that no longer supports preprints or preprint archival. A similar change in preprint policy occurred when the publisher's RoMEO colour changed from yellow to white, as was the case of two EMBO (NPG) journals and four OUP journals. In several cases, however the publisher's yellow RoMEO classification changed to green (one NPG journal, 64 OUP journals and six Wiley journals), i.e., enabling free sharing and archiving of both preprints and postprints.

Limitations of this study

The analysis presented in this paper is not meant to represent a definitive data-set for preprint policies in the biomedical sciences or even in academic publishing. The objective was to assess how widely preprint policies were starting to be accepted in a wide range of publishers, cognizant of the fact that policies are constantly changing as the publishing industry adjusts to accommodate preprints into their publishing model. This flux is evidenced by the changing data from June 2017, February 2018 and finally June 2018 for 14 publishers. Our analysis focused on 14 publishers (Table 1) that had been previously analyzed for other policies related to authorship and policies related to the correction of the literature, such as errata, expressions of concern and retractions (Teixeira da Silva & Dobránszki, 2016, 2017b). We recognize that that group might not necessarily represent the entirety of academic publishers, especially if we consider that the Sherpa/RoMEO database lists 2553 publishers, but serves as a good start for more detailed meta-analyses. This study is thus a provisional analysis, but with three time-sensitive assessments that have allowed us to appreciate how microscale changes have occurred in policies over a one-year period.

Conclusions

Preprints for the biomedical sciences within scientific publishers are on the rise.[20] Our analysis of the Sherpa/RoMEO database shows that just under 50% of publishers have clear preprint-related policies in place, 64% of 14 scientific publishers studied and listed in Table 1 had a policy for preprints in 2017 but this rate increased to 78% by February of 2018 and remained the same in June of 2018. Unless policies are clear, and unless policies by the vast majority of these publishers allow for the archival or preprints during simultaneous submission to their journals, preprints may see stifled growth. Irregular or inconsistent policies between different journals within the same publisher, or policies that show changes over time as we have discovered in this analysis (Supplementary Table 1), will also not fortify trust in preprints, because it signals that while some journal editors have confidence in the quality and scholarly value of preprints, others might not. Fluctuating preprint policies within the same publisher also send mixed signals to potential authors about the stability of preprints, and gives the perception that there is still uncertainty. Policy standardization should be carefully crafted and monitored to increase confidence in the use of preprints by academics in science. Many challenges exist to the use, academic safety and wide applicability and use of preprints. Academics are urged to exercise caution and reflect carefully on the advantages and the risks of publishing preprints, and of verifying the preprint-related policies of their selected publishing venue carefully before

[18] https://authorservices.wiley.com/author-resources/Journal-Authors/licensing-open-access/open-access/preprints-policy.html.

[19] http://www.sherpa.ac.uk/romeo/statistics.php?la=en&fIDnum=|&mode=simple.

[20] http://www.nature.com/news/2016-in-news-the-science-events-that-shaped-the-year-1.21159.

deciding whether to post their research data as a preprint prior to formal submission to a regular peer-reviewed journal.

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Conflicts of interest

Both authors declare that they have no conflicts of interest. Ethical approval and informed consent: This article does not contain any studies with human participants or animals performed by any of the authors. The authors received no funding for this research.

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