

Has COVID-19 been the making of Open Science?

*One outcome of the COVID-19 pandemic has been to put discussions about open research methods and practices, such as preprints, into the mainstream. Drawing on an recent analysis of the extent to which Open Science principles have been adopted during the COVID-19 pandemic, **Lonni Besançon, Corentin Segalas, Clémence Leyrat**, argue that while the pandemic has accelerated certain forms of Open Science, much work remains to be done to ensure that these principles are engaged with optimally.*

The Open Science movement, advocates for transparency and openness throughout the research process, as well as the accessible communication of research to the public. During the COVID-19 pandemic it assumed a central place in the debate on research integrity. This newfound public interest has heightened scrutiny and led to pushback from publishers, funders and sometimes scholars. Simultaneously, it has led to renewed efforts to encourage Open Science, leading many to hope that the global situation would somehow be a [catalyst](#) for the adoption of better and open research practices. Although many concepts fall under the [umbrella of Open Science](#), some of its key concepts are: Open Access, Open Data, Open Source, and Open Peer Review. How far these four principles were embraced by researchers during the pandemic and where there is room for improvement, is what we, as early career researchers, [set out to assess](#) by looking at data on scientific articles published during the Covid-19 pandemic.

Open Access or open interpretation?

Open Access consists in making all scientific publications available to all, free of charge and new publishing models have led to a sharp increase in Open Access manuscripts in recent years. At the start of the pandemic major publishers unilaterally made COVID-19 related research papers free to access. This was essential to enabling a timely response to the crisis. However, these papers did by no means represent all work [relating to the COVID-19](#) response. The arbitrary and potentially temporary nature of this access also confuses the value of more stable and sustainable forms of open access publishing. Finally, the opening up of access in this way demonstrates a practical and moral imperative behind open access – It accelerates important life changing research. If this is the case for COVID-19 research, why not climate change, or any other number of societal problems? This being said, the overall number of papers available in Open Access has increased, but it is too early to know whether this will lead to the wider adoption of Open Access as a principle across scientific fields.

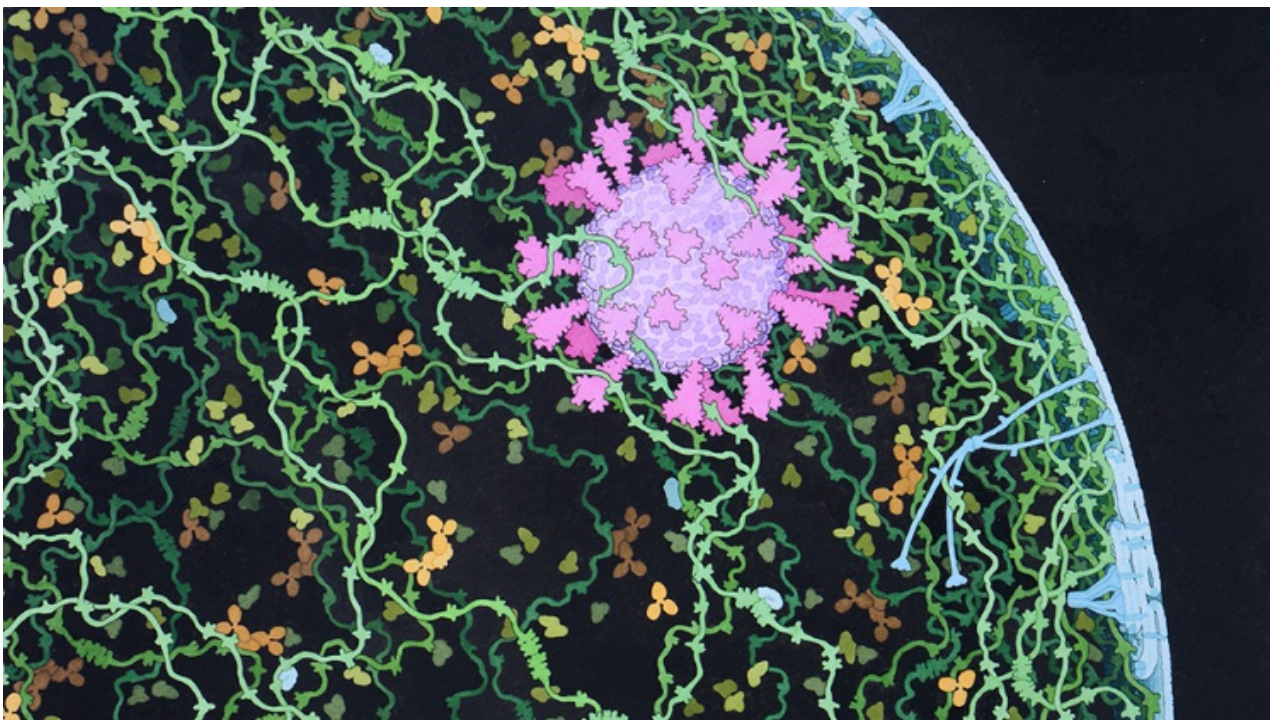


Illustration by David S. Goodsell, RCSB Protein Data Bank; doi: 10.2210/rcsb_pdb/goodsell-gallery-024 (CC BY 4.0).

Another component of Open Access is the early dissemination of papers through preprints (publications that are not yet peer-reviewed). Preprints improve the transparency of the research process, enable feedback from peers in a wider diversity of fields, enhance scientific collaboration, and speed up the dissemination of important findings. Although preprints are not new, we found an increased number of manuscripts deposited to preprint platforms since 2020. Only [174 and 75](#) preprints were shared during the Ebola and Zika virus outbreaks, respectively, while more than [30,000 were shared in 10 months](#) of COVID-19.

The surge in the use of preprints, in this respect a positive outcome of the pandemic, has brought with it significant issues of [science communication](#). As non peer-reviewed pieces of work, the scientific validity of preprints is yet to be confirmed and therefore, their content should be interpreted with caution. Unfortunately, this is not always the case. We found that preprints on Covid-19 have been reported on much more often than on other topics (Fig.1). While this is not necessarily problematic, it suggests the potentially short-term nature of preprint uptake. The level of demand from the media for preprints, especially in emerging research areas, coupled with often inexperienced analysis also heightens the risk of misinformation.

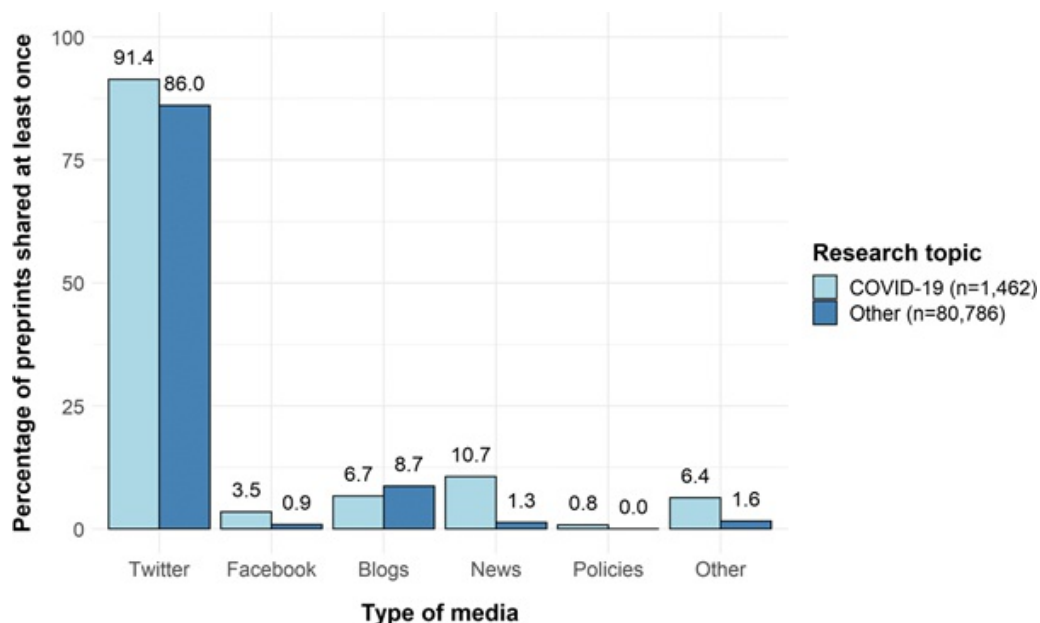


Figure.1: Proportion of arXiv preprints shared in the media broken down by research topic (Image CC-BY Besancon et al).

“Show me the Data!”

Open Source and Open Data practices consist in making all the data and materials used to gather or analyse data available on relevant repositories. While we can find incredibly useful datasets shared publicly on COVID-19 (for instance those provided by the [European Centre for Disease Control](#)), they remain the exception rather than the norm. A spectacular example of this were the papers utilising data from the company [Surgisphere](#), that led to retracted papers in The Lancet and The New England Journal of Medicine. In our paper, we highlight 4 papers that could have been retracted much earlier (and perhaps would never have been accepted) had the data been made accessible from the time of publication. As we argue in our paper, this presents a clear case for making open data and open source the default, with exceptions for privacy and safety. While some journals already have such policies, we go further in asking that, when data cannot be shared publicly, editors/publishers and authors/institutions should agree on a third party to check the existence and reliability/validity of the data and the results presented. This not only would strengthen the review process, but also enhance the reproducibility of research and further accelerate the production of new knowledge through data and code sharing.

Blinding reviews or blinding researchers?

Finally, [Open Review](#) consists in making in reviewers' reports available (anonymised or not). To the best of our knowledge, open review practices have not been affected by the pandemic. However, we put forward that the adoption of Open Reviews (in any form) could have significantly helped to assess the credibility of some scholarly communications. To this end, we analysed the time between submission and acceptance of over 12000 Covid-19 papers, and we found 699 papers that had been reviewed and accepted in a day or less. This result was concerning in itself, but it got worse when we found that among the authors of those papers, many had editorial conflict of interests with the journal in which the papers were published. Although such short reviewing time and editorial conflicts of interest could be acceptable for some types of submission (e.g. viewpoints, editorials, letters), we found that 224 research papers presenting original research findings were reviewed in a day or less. Out of these, 71 also presented editorial conflicts of interest. In all of these instances, having access to the reviewers reports would help readers assess how thorough the reviewing process was.

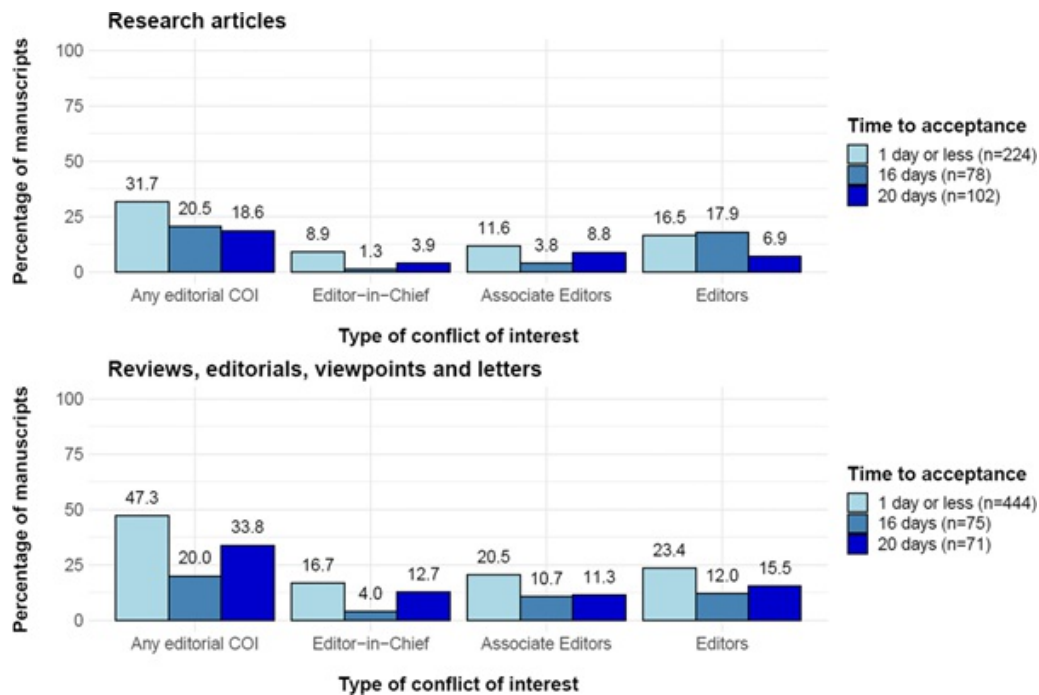


Figure.2: Distribution of conflicts of interest according to the type of article for COVID-19 research articles with a submission-to-acceptance time of a day or less, 16 days and 20 days. COI: conflict of interest. Note: for fairness of comparison, we restricted our analysis to articles submitted before 11th July 2020, since it was the last submission date at which an acceptance time of 20 days could be observed. (Image CC-BY Besancon et al).

Stage	Problem	Solution	Helps to know...	Agents
Data collection and analysis 	Waste of research (duplication)	Preregistration	Who is doing what, how and when?	Researchers to adopt it Journals to enforce it
	Ethical concerns	Preregistration	Is the study in line with good research practices?	
	Flawed studies	Registered reports	Is the study designed appropriately to answer the question of interest?	
Publication process 	Expedite reviewing	Open reviews	Are the findings verified by independent researchers?	Researchers to adopt it Journals to enforce it Institutions and funding agencies to value it Policymakers to allow it
	Distrust of published results	Data and code sharing	Can scientist obtain similar results from the same data?	
	Conflict of interests	Disclosure of conflict of interests, including editorial roles	Are the authors incentivized to publish these findings and to publish in this journal?	
Communication 	Misuse of preprints	Collaboration between journalists and scientists	Can the public trust scientific news in the media?	Journalists and news editors Institutions
	Misleading headlines, exaggerations			
	Paywalled manuscripts	Open Access on all manuscripts	The exact content of manuscripts used as a source. Can accelerate research through universal access to scientific findings	Researchers to favor it Policymakers and institutions to enforce it

Figure.3: A summary of our findings and proposed solutions. (Image CC-BY Besancon et al).

Our research found that whilst the pandemic highlighted many aspects of open science, they were not always fully or optimally applied. We explore this further in our full paper, where we discuss other neglected Open Science principles that could have helped during the pandemic (summarised in Fig.3). The COVID-19 pandemic was a golden opportunity for publishers, institutions and authors alike to adopt transparency, unfortunately it has not thus far acted as the catalyst some had hoped it could be. However, despite this seeming failure, this moment of public attention provides an opening for scientists to tackle the issue and more broadly share the philosophy of Open Science with the public and continue working towards a better science.

This post draws on the authors' co-authored article, [Open science saves lives: lessons from the COVID-19 pandemic](#), published in BMC Medical Research Methodology.

Note: This article gives the views of the author, and not the position of the LSE Impact Blog, nor of the London School of Economics. Please review our [comments policy](#) if you have any concerns on posting a comment below

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