The White House's march towards open science: implications for Canada

David Moher [a,b] and **Kelly D. Cobey** [b,c]

[a]Clinical Epidemiology Program, Ottawa Hospital Research Institute, Ottawa, ON, Canada; [b]School of Epidemiology and Public Health, University of Ottawa, Ottawa, Canada; [c]Meta-research and Open Science Program, University of Ottawa Heart Institute, Ottawa, Canada

Corresponding author: **David Moher** (email: dmoher@ohri.ca)

In August 2022, the White House's Office of Science and Technology Policy (OSTP) announced that as of January 2026, publications resulting from US federally funded research will have to be immediately accessible to the public (The White House 2022). COVID-19 publications might foreshadow what 2026 will look like, more generally. During the pandemic many paywalled and hybrid publishers made COVID-19 research openly available immediately to the public[1] (Larrègue et al. 2020).

The OSTP announcement is a positive step for the public and likely a concern for publishers, particularly the "oligopoly", the top five for profit publishers that account for more than 50% of all publications. While these publishers have gold OA journals (i.e., immediate release of research papers upon publication), they also have large portfolios of paywalled/hybrid journals that have made a considerable fortune from fees to enable immediate OA. In a recent analysis of the oligopoly, they have generated about $1 billion dollars in revenues from author processing charge fees between 2015 and 2018 for OA and hybrid journals (Lucas-Dominguez et al. 2021). This stream of revenues and profits might be impacted by the 2026 OSTP requirement. Publishers are unlikely to stand by and see a substantial loss in revenues. They may start offering alternative services that will allow them to maintain fees. They may offer publication packaging to reach wider audiences; they may offer lay summaries alongside abstracts or help with implementing data sharing. It is possible that the OSTP announcement may conceivably increase profits for the oligopoly—if authors are willing to pay OA article processing charges at a hybrid journal, it allows a two-way revenue stream whereby institutions pay a fee to subscribe to journal content, while authors pay to make their individual articles free.

The second part of the OSTP announcement is the requirement of immediate availability of the data underpinning the results of the research at the time of publication. When then-Vice President Biden was tasked with the Cancer "Moonshot", he was aware of the lack of data sharing among cancer researchers. There are discipline-specific and general venues to share data, (e.g., Zenodo and Figshare). Canada has also developed repositories for researchers to share data (e.g., Dataverse and Federated Research Data Repository). These infrastructure developments have been implemented inconsistently across disciplines. For example, there is very limited uptake of data sharing practices and resources in biomedicine. In ecology, and other disciplines, the data sharing practices are more normative. While many stakeholders committed to making COVID-19 data open (Wellcome 2020), the reality is that compliance to this commitment was poor (Larrègue et al. 2020; Lucas-Dominguez et al. 2021). It is also unclear whether there is sufficient training and educational outreach in disciplines where data sharing is not a normative practice.

Are there implications for Canada regarding the OSTP announcement?

Both OA and data sharing are part of a growing global movement known as open science (OS). Universities, particularly in Europe, are calling for the integration of OS practices as part of hiring, promotion, and tenure. Unfortunately, Canada is not yet in a position of leadership in OS[2]. The Tri-Agencies do not provide any dedicated funding competitions for OS research nor is there public facing monitoring to track our performance and benchmark for improvement. This needs to happen for Canada to be seen as a player. Furthermore, Canada would need to invest into actions that would help foster behaviour change and education pertaining to implementing OS. Actions, including developing and

---

[1] https://wellcome.org/press-release/sharing-research-data-and-findings-relevant-novel-coronavirus-ncov-outbreak.

[2] https://science.ised-isde.canada.ca/site/science/en/office-chief-science-advisor/open-science/open-science-dialogues-summary-stakeholders-round-tables.

funding reproducibility networks (Thibault et al. 2022) and providing free online training, are needed.

Immediate OA upon publication

As of today, the Tri-Agencies have no OA policy regarding the immediate release of research upon publication for their grantees. The policy that does exist is part of a legacy holdover based on a compromise between publishers and the White House during the tenure of President Barack Obama, namely an embargo period (e.g., 12 months), prior to publication. Because research is often an international endeavour, the new OSTP announcement is likely important to ensure Canada is in line with other emerging international initiatives (Barbour et al. 2022). There are other initiatives by individual publishers to make research more immediately available (e.g., Nature's transformative agreement; Brainard 2020) and other communities to reduce the barriers associated with journal fees to publish openly (e.g., cOAlition S[3]).

The Tri-Agencies could also consider a zero-cost recommendation to ensure immediate OA for publication outputs from their grantees. Preprints are manuscripts published prior to formal submission to a peer-reviewed journal. There is no fee associated with putting a manuscript on a preprint server. Almost all journals allow preprinting prior to journal submission.[4] The emerging body of evidence, comparing the results and conclusions reported in preprints and the subsequently peer-reviewed published version, appears to indicate little difference between both (Zeraatkar et al. 2022).

OA publishing is also an important lifeline for patients and members of the public, neither of which typically have access to paywalled articles that can be accessed through university libraries. Canada has made a strong commitment to patient partners as a central member of the research enterprise. This needs to include immediate access to the outputs of research they are involved in (Canadian Institutes of Health Research 2023).

Publications based on funded research continue to be published in predatory journals (Grudniewicz et al. 2019). These publications also leak into policy documents and other trusted sources, primarily for two reasons. Predatory publishers offer immediate OA upon publication, and their publication fee is a magnitude cheaper than that of legitimate journals (Moher et al. 2017).

Data sharing

The Tri-Agencies are in the process of moving towards encouraging data sharing in a phased approach,[5] with requirements for data management plans now implemented in several grant competitions, with further rollouts forthcoming. However, for some disciplines, there is little infrastructure or guidance in place today to ensure data management is suc-

cessful and will continue to be required. For some disciplines, infrastructure and supports for the eventual requirement to share data whenever possible appear entirely opaque at this time, which may suggest that the unfortunate reality is that the phased approach to implement data sharing may take many more years. If this is the case, it will make Canada less competitive internationally, because Canadian researchers in some disciplines will not be practising a normative behaviour practised elsewhere.

The Digital Research Alliance of Canada (Alliance) is funded to "transform how research across all academic disciplines is organized, managed, stored and used" in Canada. As part of this mission, the Alliance funded 18 pilot data champion programs across a broad range of disciplines.[6] These programs aimed to support uptake of robust data management through education and related initiates. They will end in the spring of 2023, and there is no indication as to whether there will be funding for any of them to be scaled up to national programs. Additional considerations (and cost) will be needed to share sensitive data and data from First Nations and Indigenous communities. It is unclear whether this investment is happening. The 2022 State of Open Data report (an annual survey of researchers working with open data) indicates that there is insufficient training in the planning or execution of data sharing (Goodey et al. 2022).

While there are data management plans (DMPs) contained within the Alliance's resources, there are some gaping holes. For example, randomized controlled trials (RCTs) are conducted in many disciplines; there are no DMPs for RCTs yet. Similarly, while there are helpful training resources, they are incomplete. The Alliance DMPs provide limited information on how to annotate and enable code sharing for biomedical research (Culina et al. 2020; Laurinavichyute et al. 2022). However, there are helpful code sharing resources for some other disciplines.[7,8] Additional funding is badly needed if the federal mandates are going to be successfully implemented.

While academic libraries, particularly those with open science/scholarly communications librarians, have stepped up to the plate to help fill the void and develop data sharing resources, this is not sustainable as the number of demands increase. Libraries are already overstretched and understaffed, and the expertise required across disciplines does not exist everywhere. It is likely unreasonable to ask librarians to help grantees develop the appropriate documentation for code sharing for specific datasets (e.g., sociology). Sharing data without the code used to arrive at the results is not likely to help with data re-use, an important goal of data sharing.

There is no clear Tri-Agencies guidance as to whether grant applicants can include a budget line item for data sharing costs. This requires more immediate clarification. Similarly, there does not appear to be federal funding mechanisms in place to develop training and educational

---

[3] https://www.coalition-s.org/ [accessed 5 May 2023].

[4] https://v2.sherpa.ac.uk/romeo [accessed 5 May 2023].

[5] https://science.ised-isde.canada.ca/site/science/en/interagency-research-funding/policies-and-guidelines/research-data-management/tri-agency-research-data-management-policy-frequently-asked-questions.

[6] https://alliancecan.ca/en/latest/news/announcing-2022-2023-data-champions.

[7] Ecology code sharing.

[8] https://github.com/.

suites to help facilitate a complex series of data and code sharing tasks.

The Tri-Agencies and other funders should undertake more explicit documentation as to what data mean. This will facilitate data sharing across disciplines. For STEM, this is likely more obvious, such as the data produced from an experiment. However, in the humanities and the arts, this is less clear, although more thinking about digital humanities[9] and action is taking place[10].

Researchers may want to keep their data and not share it due to the perverse incentive structures at universities and other research organizations (O'Dea et al. 2021). Currently, the number of publications and the journal impact factor (JIF) of the journals where the research is published are a significant currency for promotion and tenure (McKiernan et al. 2019). The JIF is a bad proxy for the quality of an article. Universities could modify that promotion and tenure criteria to support data sharing and OS more generally. When completing their research assessments for each included research publication, researchers could include a URL as to where the publication's data are deposited. This would be in keeping with the increasing global endorsement of the Declaration of Research Assessment (Hatch and Curry 2020). Data sharing is also starting to be required by some publishers.

The Swiss Academy of Arts and Science convened a "Researcher Sounding Board" to provide guidance on the National Open Research Data Strategy and Action Plan. The sounding board meets four times a year. Perhaps, a similar approach can be implemented in Canada.

The office of the Chief Science Advisor of Canada has indicated that Canada is not yet in a position of leadership concerning open science[11]. It is possible that a strong Canadian response, like the OSTP initiative in the US, aligning ourselves with the international community might bring us closer to a leadership position, particularly for data sharing.

Article information

Editor
Jeff C. Clements

History dates

Copyright

---

[9] https://miriamposner.com/blog/whats-next-the-radical-unrealized-potential-of-digital-humanities/.

[10] https://ecampusontario.pressbooks.pub/dataprimer/chapter/transforming-data-management-into-scholarly-and-creative-work/.

[11] https://science.gc.ca/site/science/en/office-chief-science-advisor/open-science/open-science-dialogues-summary-stakeholders-round-tables.

Author information

Author ORCIDs
David Moher https://orcid.org/0000-0003-2434-4206
Kelly D. Cobey https://orcid.org/0000-0003-2797-1686

Author notes
David Moher served as Subject Editor at the time of manuscript review and acceptance; peer review and editorial decisions regarding this manuscript were handled by Jeff Clements.

Author contributions
Conceptualization: DM, KDC
Project administration: DM
Writing – original draft: DM
Writing – review & editing: DM, KDC

References

Barbour, V., Flanagan, D., and Tairi, K. 2022. No turning back on global open access. BMJ, **379**: o2334. doi:10.1136/bmj.o2334. PMID: 36198424.

Brainard, J. 2020. Nature journals ink open-access deal. Science, **370**(6515): 391. doi:10.1126/science.370.6515.391-a. PMID: 33093088.

Canadian Institutes of Health Research. 2023. Strategy for patient-oriented research. Available from https://cihr-irsc.gc.ca/e/41204.html. [accessed 5 May 2023].

Culina, A., van den Berg, I., Evans, S., and Sánchez-Tójar, A. 2020. Low availability of code in ecology: a call for urgent action. PloS Biology, **18**: e3000763. doi:10.1371/journal.pbio.3000763. PMID: 32722681.

Goodey, G., Hahnel, M., Zhou, Y., Jiang, L., Chandramouliswaran, I., Hafez, A., et al. 2022. The State of open Data 2022. Digital Science report. doi:10.6084/m9.figshare.21276984.v4.

Grudniewicz, A., Moher, D., Cobey, K.D., Bryson, G.L., Cukier, S., Allen, K., et al. 2019. Predatory journals: no definition, no defence. Nature, **576**(7786): 210–212. doi:10.1038/d41586-019-03759-y. PMID: 31827288.

Hatch, A., and Curry, S. 2020. Changing how we evaluate research is difficult, but not impossible. Elife, **9**: e58654. doi:10.7554/eLife.58654. PMID: 32782065.

Larrègue, J., Vincent-Lamarre, P., Lebaron, F., and Larivière, V. 2020. COVID-19: where is the data? LSE blog. Available from https://blogs.lse.ac.uk/impactofsocialsciences/2020/11/30/covid-19-where-is-the-data/. [accessed 22 December 2021].

Laurinavichyute, A., Yadav, H., and Vasishth, S. 2022. Share the code, not just the data: a case study of the reproducibility of articles published in the Journal of Memory and Language under the open data policy. Journal of Memory and Language, **125**: 104332. doi:10.1016/j.jml.2022.104332.

Lucas-Dominguez, R., Alonso-Arroyo, A., Vidal-Infer, A., and Aleixandre-Benavent, R. 2021. The sharing of research data facing the COVID-19 pandemic. Scientometrics, **126**(6): 4975–4990. doi:10.1007/s11192-021-03971-6. PMID: 33935332.

McKiernan, E.C., Schimanski, L.A., Nieves, C.M., Matthias., L., Niles, M.T., and Alperin, J.P. 2019. Use of the journal impact factor in academic review, promotion, and tenure evaluations. eLife, **8**: e47338. doi:10.7554/eLife.47338. PMID: 31364991.

Moher, D., Shamseer, L., Cobey, K.D., Lalu, M.M., Galipeau, J., Avey, M.T., et al. 2017. Stop this waste of people, animals and money. Nature, **549**(7670): 23–25. doi:10.1038/549023a. PMID: 28880300.

O'Dea, R.E., Parker, T.H., Chee, Y.E., Culina, A., Drobniak, S.M., Duncan, D.H., et al. 2021. Towards open, reliable, and transparent

ecology and evolutionary biology. BMC Biology, **19**: 68. doi:10.1186/s12915-021-01006-3. PMID: 33836762.

The White House. 2022. OSTP issues guidance to make federally funded research freely available without delay. The White House, Washington, DC. Available from https://www.whitehouse.gov/ostp/news-updates/2022/08/25/ostp-issues-guidance-to-make-federally-funded-research-freely-available-without-delay/. [accessed 4 May 2023].

Thibault, R.T., Munafò, M.R., and Moher, D. 2022. Rigour and reproducibility in Canadian research: call for a coordinated approach. FACETS, **7**: 18–24. doi:10.1139/facets-2021-0162.

Zeraatkar, D., Pitre, T., Leung, G., Cusano, E., Agarwal, A., Khalid, F., et al. 2022. Consistency of COVID-19 trial preprints with published reports and impact for decision making: retrospective review. BMJ Medicine, **1**: e000309. doi:10.1136/bmjmed-2022-000309. PMID: 36936583.