POLICY BRIEF FOR JOURNALS AND PUBLISHERS

SUMMARY

Open Science to Increase Reproducibility in Science (OSIRIS) contributes to reform of the research and innovation system from the top down and the bottom up, to regain overall trust in science, by investigating the underlying drivers and facilitators, co-creating, and testing effective evidence-based solutions, identifying incentives for reproducibility by stakeholders, and embedding reproducibility in research design. The reproducibility of research results is fundamental for rigorous, trustworthy science.

We explored barriers, drivers, enablers, and incentives to reproducibility through systematic literature review, interviews with researchers across Europe, focus group discussions with stakeholders, and an audit of policies and guidelines of public funders using Transparency and Openness Promotion (TOP) 2025 criteria. OSIRIS is also developing a dashboard to monitor open science practices across published papers.

Journal policies and guidelines that promote data and code sharing and structured research results reporting are viewed as powerful enablers, though adherence monitoring is patchy. Peer reviewers are also pivotal for the quality of reproducible research. Assessment of journals showed most have data sharing requirements, yet few promoted broader TOP guidelines. Editors cited resource constraints and lack of automation tools as barriers to verifying reporting quality and data and code sharing. The OSIRIS observatory dashboard reveals low diagnostic accuracy in current automated tools, underscoring the need for standardisation in research outputs.

Our recommendations urge journals to implement adaptable TOP 2025 guidelines across all disciplines; promote structured article formats for better monitoring; and support research into effective reproducibility checks.

BACKGROUND

The reproducibility of research results is fundamental for rigorous science as it confirms or corrects the outcomes of single studies. Reproducibility is understood as a continuum from the reproduction of results – based on the same data, code, and methodology – to replication – meaning the repeating of results using the same analytical method, but with different data. When results can be independently verified, research that goes on to influence future research and policy decisions moves forward with confidence. However, reproducibility remains a major challenge in many research disciplines.

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Multiple institutional stakeholders play an important role in the science ecosystem: research funders, publishers, journals, and research performing organisations. Through their policies, guidelines, initiatives, support, and interventions, they can influence the quality and trustworthiness of research by removing barriers that hinder reproducibility, and promoting facilitators that enhance it.

Open Science to Increase Reproducibility in Science (OSIRIS) investigates the under-lying barriers, drivers, and facilitators; tests effective evidence-based solutions, identifying incentives for reproducibility by stakeholders, and embedding reproducibility in research design. In a systematic scoping review, we assessed the extent to which Open Science interventions have been rigorously tested for their effectiveness to improve reproducibility. Interviews with 60 researchers across Europe examined views, practices, and motivations for reproducibility across disciplines, with factors that facilitate or hinder. Seven focus group discussions with research funders, journal editors, research institution leadership, national reproducibility networks, reproducibiliTea journal clubs and civil society organisations (58 participants) explored roles and responsibilities of these stakeholders to assure the quality and trustworthiness of research, with initiatives to facilitate or remove barriers. An audit using Transparency and Openness Promotion (TOP) 2025 criteria assessed how research institutions, journals and funders address and promote reproducibility in their policies, procedures and guidelines.

The OSIRIS dashboard was developed to monitor open science practices across articles, focusing on ten prominent medical journals. It combined existing tools with a Large Language Model based tool, whose diagnostic accuracy was assessed using gold standard datasets. Validation studies revealed limited precision for individual-level analysis and cross-initiative comparisons. As a result, the dashboard emphasizes cautious interpretation and avoids journal- or institution-level evaluations. It contributes to broader methodological discussions and offers recommendations to improve open science monitoring.

WHAT RESEARCHERS SAY

During interviews, journal policies and guidelines that encourage or mandate the sharing of data and code or the structured reporting of Materials and Methods are very much viewed as enabling forces in all disciplines, except humanities. While such measures are also described as still patchy or weakly enforced, their presence is seen to signal normative shifts. Alongside that, also the role of peer reviewers is seen as crucial to help ensure that published research is well described and reproducible.

It depends on the journal.
The journals we work with require certain minimum information to ensure reproducibility, like sample sizes and basic methodologies. However, they don't typically provide extensive guidelines on specific reproducibility practices.
It's more about the reviewers. If a reviewer is particularly interested in reproducibility, they might request additional information, which we can provide.
There's no standardized requirement from journals to detail every aspect of reproducibility in the guidance they provide.
(Medical scientist, France)

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TRANSPARENCY AND OPENNESS PROMOTION

The Transparency and Openness Promotion (TOP) guidelines have been in existence for ten years. Our assessment of policies and guidelines of the top journals where Horizon funded research is published using the TOP 2025 criteria shows that, among research practices that promote transparency, journals mostly engage with data and code sharing. Most journals have at least some data sharing provisions in place. Of the 20 journals assessed, 16 (80%) met at least Level 1 of the TOP data sharing criteria (i.e. requiring Data Availability Statement), and 12 exceeded Level 1 (i.e. requiring data deposit in a repository). Other TOP criteria are largely not promoted, supported, or recognised in policies or practices, or only required for clinical trials. Ensuring independent verification of research practices (TOP Level 3) or resourcing independent checks on reporting accuracy or computational reproducibility were rare within our study sample. Some practices were only required for clinical trials.

> ***And now we see more and more journals asking authors to share their data, which is very, very good, very positive. (Social scientist, UK)***

MONITORING QUALITY AND REPRODUCIBILITY

During focus group discussions, journal editors indicate that monitoring reporting quality, the use of reporting guidelines, and making research data and code openly available is resource intensive to check. Automation was suggested as a potential solution, as manually verifying compliance is impractical at scale. Currently the lack of universal tools available to publishers limits progress.

The OSIRIS work undertaken to develop an observatory dashboard to monitor open science practices across articles and institutions highlights important limitations in the use of tools that automatically extract information from research papers. Our analyses show that their diagnostic accuracy is often poor. Caution is therefore warranted when interpreting their results—particularly when assessing individual articles or comparing journals with different formatting or reporting conventions. Such inconsistencies can lead to biased or incomplete outputs that may misrepresent the underlying research

Nonetheless, the development of the observatory reflects a growing interest in tracking broader trends in research practices over time. Even with their current limitations, automated tools can help reveal large-scale patterns related to transparency, reproducibility, or reporting quality across disciplines. To make these tools more reliable and useful, there is a pressing need to standardise how research outputs are reported and structured. This includes the consistent use of metadata, structured abstracts, and adherence to reporting guidelines in a machine-readable format. Improving standardisation would reduce noise in automated analyses and allow for more meaningful comparisons. Ultimately, these efforts would support the creation of more robust and scalable infrastructures for monitoring the scientific literature and informing research policy.

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I just got a paper accepted in a journal where they ask for all of your data and all of your code to be put online in an easy-to-use format, and that should be what every journal does. But in my experience, that's not the case.
(Social scientist, Belgium)

POLICY RECOMMENDATIONS FOR JOURNALS AND PUBLISHERS

- We call for all scientific journals to implement the Transparency and Openness Promotion (TOP) 2025 guidelines, also ensuring that policies are homogenous between clinical trials and other research. Here the needs and adaptation of TOP 2025 guidelines for different fields needs to be considered. For instance, implementing all TOP research practices at Level 3 across all disciplines and sub-fields may not be possible or practical. However, editorial boards can consider what TOP practices and levels are applicable and desirable within their domains and publish clear editorial guidance and justifications for their authors.

- Standardisation and structured formats of articles to facilitate monitoring of open science practices across journals. That way data within the articles, metadata, and supplementary documentation are easily discoverable by readers and reviewers while also facilitating programmatic extraction of information by automated tooling.

- Journals to implement meta-research as part of their policies. For example, further research is required to evaluate the effectiveness of reproducibility checks prior to implementing the checklist OSIRIS developed. Assessing successful and unsuccessful approaches will inform improvements for future iterations. Journals have an important role to play in opening up their editorial processes to experimentation to generate evidence on what works best to promote rigor, transparency, and reproducibility within their domains.

References:

D2.2 What Helps and Hinders Reproducible Research? Researchers' Perspectives from a Cross-Disciplinary Interview Study. https://osf.io/exy5f

D2.3 Examining Infrastructure to Support Scientific Reproducibility in the EU: An Examination of Journals, Funders, and Academic Research Institutions. https://osf.io/n7bsw
D3.2 OSIRIS observatory dashboard.

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