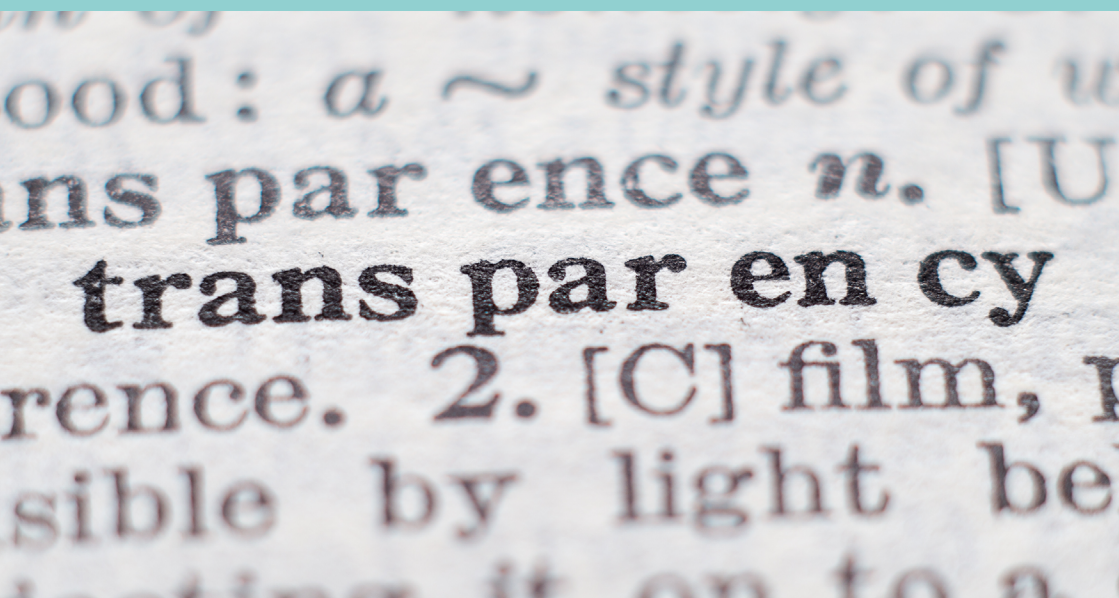


Transparency in research:

principles, guidelines, and limits

Research integrity ensures that research work is accepted, can be used by others, and is respectful of study participants



What is transparency in research and where can I find guidelines?

Applying [Cambridge Dictionary's definition](#), transparency in research can be defined as research activities and processes that are done openly, without secrets, so that other colleagues and the public can trust that they are fair and honest.

The four pillars of research transparency

- Registering research
- Publishing and disseminating findings and conclusions
- Granting access to the data and samples used in the research
- Providing information at the end of the research to participants

Source: NHS



Local and international guidelines and codes consider the issue of research transparency in different ways. For instance, Article 5.1 of the [General Data Protection Regulation \(GDPR\)](#), in the European Union framework, establishes ‘transparency’ as **one of the principles relating to the processing of personal data**: “Personal data shall be processed lawfully, fairly and in a transparent manner in relation to the data subject”.

In its [Recital 39](#), the EU further states that individuals should know how “personal data concerning

them [is] collected, used, consulted or otherwise processed and to what extent the personal data are or will be processed”.

Other key aspects related to transparency are discussed in different international initiatives. One of these is the [FAIR Guiding Principles for scientific data management and stewardship](#), published in 2016 in *Scientific Data*, that tries to provide guidelines to make research findable, accessible, interoperable, and reusable.

Data, analysis and production

Research transparency [encompasses three dimensions](#): data, analysis, and production.

- Data transparency: researchers should make the evidence or data used to support their research and claims available to readers. “This permits readers to appreciate the richness and nuance of what sources actually say, assess precisely how they relate to broader claims, and evaluate whether they have been interpreted or analyzed correctly”.
- Analytic transparency: researchers should make information about data analysis accessible. Readers should be able to check the interpretive process by which an author infers that evidence supports a specific claim.
- Production transparency: readers should be granted access to “[i]nformation on methods by which particular bodies of cited evidence, arguments, and methods were selected from among the full body of possible choices”.

Source: [Andrew Moravcsik, Princeton University](#)

Because researchers are using more and more computational tools to deal with huge amounts of data, the principles emphasize the “machine-actionability”, that is, according to the definition provided by [the GO Fair Initiative](#):

“The capacity of computational systems to find, access, interoperate, and reuse data with none or minimal human intervention”.

The [Transparency and Openness Promotion \(TOP\) Guidelines](#),

published in 2015, provide a suite of useful tools to promote transparent research. They include eight modular standards: (I) citation; (II) data; (III) analytic methods and (IV) research materials transparency; (V) design and analysis transparency; (VI) preregistration of studies; (VII) preregistration of analysis plans; and (VIII) replication. These allow flexibility in their adoption, as they depend on the disciplines, but at the same time, they establish community standards.

The **EQUATOR network** seeks to improve the reliability and value of published health research literature and [offers guidelines](#) for transparent and accurate reporting for many study types, from randomized trials to case reports and study protocols. It is very comprehensive source, with a highly detailed, searchable database of reporting guidelines.

There is also an [international initiative committing to research transparency](#), which guides and encourages transparency and openness in research. The initiative is addressed to researchers, reviewers, PhD students, committees and editorial boards, and it promotes the values of Open Science. In the case of researchers, they support making raw data and reproducible data analysis scripts available, describing all data elaboration decisions, and encouraging all authors to act in line with these principles.



Be transparent!

Make sure your research is:

Concise, clear, and easily accessible; written in plain language if possible, and available orally upon request.

In your team, try to cooperate with your colleagues to make the data as sound as possible. This protection of the primary data is key. All the researchers in your team should have access to these primary data, which should be protected for at least 10 years.

The importance of transparency in research

- Transparency enables others to evaluate, re-use, and trace the origin of data, and it should be preserved throughout the research data management cycle. In this sense, as stated [in a recent article in PLOS Biology](#), “data sharing is a critical component of research transparency ... as it allows independent investigators to explore new hypotheses, synthesize evidence across studies, and implement the same experimental methods using the same data”.
- Transparency can foster the re-use of and further investigation of the data collected, and it increases the availability of digital data for future generations of researchers. Transparency is closely linked to the digitalization process, allowing researchers to cooperate, use and re-use data in a new and possibly more effective manner.
- **Some EU and national funding schemes either strongly advise**



or require researchers to be transparent. Following research integrity guidelines, including those related to transparency, is an efficient way to ensure projects are well managed and also to improve your funding success.

- Transparency is strictly linked to **open science initiatives**, and the [open science paradigm](#) is increasingly more present in research. It is also essential in processes such as open collaboration and open peer review.

Most national research funding organizations in Europe are expected to ask researchers to publish their results in open access in the near future. This requirement will pose challenges regarding competitors in other countries. For instance, the language of publication (usually English) allows heavy re-use of research results worldwide, whereas most research done in Asia is not translated into English, preventing European researchers from accessing it.

Thus, there are many international initiatives, such as the [World Conferences on Research Integrity](#), that try to promote exchange of information and discussion about responsible research conduct.

Another challenge is **conflicts of interests**, both financial and private. If a researcher is asked to peer review an article written by a colleague, this is a personal conflict of interest. The main guideline is simply to declare that a conflict



of interest exists. For instance, if a researcher is attending a conference, they should inform the organizers if they have a conflict of interest, especially if the researcher is publishing an article. Some journals have already started to ask for declarations of non-financial conflicts of interest.

As if these reasons were not convincing enough, researchers' self-interest is also at stake, as Florian Markowitz (University of Cambridge, Cancer Research UK Cambridge Institute) argues in his article, 'Five selfish reasons to work reproducibly'. (*Genome Biol* 16, 274 (2015). <https://doi.org/10.1186/s13059-015-0850-7>)

Balancing transparency and privacy

A challenge is how to make the data more transparent but, at the same time, to protect intellectual property rights and respect copyright while also safeguarding security issues around certain disciplines and research domains.

Building a good research culture

Even without any binding laws or specific regulation on transparency, except for data protection within the GDPR, the research community should work together and be responsible for building a research culture that is more open, transparent, and self-regulating.

In the absence of a European or national agency on research integrity and scientific misconduct, it is advisable, helpful and effective for researchers to encourage each other to follow transparency guidelines.



The limits of transparency

According to Karen EC Levy and David Merritt Johns, researchers at Data & Society Research Institute and Cornell University, (New York) data transparency is also subject to limitations. First of all, open processes involve substantial amounts of time and money, so they may be associated with resource

shortages. Sharing huge data sets and samples, for instance physical materials, can likewise be difficult or impossible in a practical sense.

There are privacy concerns as well. In the era of big data and artificial intelligence (AI), study participants may be

concerned how their sensitive personal data is handled. Most national laws restrict and strictly regulate the use of these data, and when researchers work with sensitive data, they can anonymize or store them carefully. However, in the case of an automated system working with huge amounts of information, these safeguards can be difficult. The AI tool processes data, uses them, and reuses them, making decisions in a context free of regulations. This is a challenging emerging field that will soon need to be regulated.

Moreover, other types of sensitive information, such as trade secrets, are also a source of constraint. Some researchers are afraid their ideas might be stolen or that others will publish them first. They may also be afraid other researchers could benefit from using shared data or material without putting in appropriate effort, as highlighted by Elizabeth Gilbert, postdoctoral research fellow in psychiatry and behavioral sciences, Medical University of South Carolina, and [Katie](#)



[Corker](#), assistant professor of psychology, Grand Valley State University [in an article in *The Conversation*](#).

Thirdly, “epistemological limitations constrain data-driven political decision-making. Agencies charged with protecting public health and the environment must make decisions in the face of scientific uncertainty, because science by its nature is incomplete and only rarely provides precise answers to the complex questions to policymakers pose”.

Authors: Cristina Sáez. **Reviewer:** Teodora Konach [Austrian Agency for Research Integrity, OeAWI]

Images: iStock by Getty Images

This Transparency overview is part of the Ethical Researcher series developed in the framework of the Path2Integrity project, a European Union Horizon 2020 research and innovative programme that raises awareness about research integrity, while educating on how to argue in favour of responsible research and reliable research results. The main goal is to explain how important it is for researchers and society to sustain a culture of research integrity.

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This project is funded by the European Union's Horizon 2020 research and innovation programme under grant agreement No 824488