Proceedings of the Pakistan Academy of Sciences: B. Life and Environmental Sciences 57 (2): 1-3 (2020)

ISSN: 2518-4261 (print), ISSN 2518-427X (online)

Pakistan Academy of Sciences

Opinion

Revisiting Open Science from the Perspective of Ethical Standards

Zabta Khan Shinwari[1*] and Ali Talha Khalil[2]

[1]Department of Plant Sciences, Quaid-i-Azam University, Islamabad, Pakistan
[2]Department of Pathology, Lady Reading Hospital (MTI), Peshawar, Pakistan

Abstract: Narrative of open science is becoming popular as the idea of openness relates to the availability, accessibility, transparency and replicability of the scientific data and processes. At the downside, open science, raises several ethical questions. Openness in sensitive data can lead to its misuse by compromising anonymity and confidentiality, or may be used for other nefarious purposes, besides being the costly nature of the open models. Extensive debates and dialogues among the policy experts, scientists and bioethicists in the context of weighing risks vs benefits may help in devising balanced strategies.

Keywords: Open science, Replicability, Anonymity, Risks, Benefits.

OPINION

The replication crises and lack of reproducibility in experiments represents a major concern across the scientific circles. Building on the recent developments of retractions of papers related to fabrication and falsification of data of Covid-19 from certain elite journals strengthens the case for open science. Open science is an umbrella term that aims to characterize scientific research in terms of reproducibility, reliability, visibility, replicability, transparency and rigor [1]. Therefore, open science is gaining overwhelming popularity as it addresses the intricate questions of scientific reliability through reanalysis and validation of data, open access model of publishing, assessments, presentation, double-blind reviews etc. [2]. Different reasons like lack of proper scientific practices, publication bias, and human errors etc. can result in generating scientific data that lacks reproducibility [3].

Science is the main source behind our understanding of this cosmos including all its processes and the generated knowledge should be open to everyone inhabiting this planet. Funding for the research is usually allocated by the governments through the capital collected in the form of public taxes, making public an equally important stake holder in the research. Similarly, open science will further strengthen the reliability and integrity of research. Recently, Forbes published a report on studies eight cancer studies that contained copy results [4]. Another bibliometric study revealed increase in the retractions of publications in oncology [5]. The data integrity driven retraction of papers on corona virus from elite medical journals is alarming to which critiques has raised eye brows on the peer review process and evaluation of data [6, 7]. The influx of scientific data, which is unreliable and fails to get validated is dreadful for the reputation of the scientific community and undermines the ethical standards of research, publishing and responsible conduct. Such critical concerns has bolstered the need openness in science that can be expressed as open methodology, open data, open source and open access [8].

With many of the scientists propels the thought of bringing openness in science, there are scientists reluctant to encourage it. For example, contrary of the readers pay model in closed access journals, majority of the open access journal relies on the authors to pay their article processing charges (APC) after acceptance. These APCs for some journals can be too expensive making open access publication a second choice for scientists especially from the poor

Received: May 2020; Accepted: June 2020
*Corresponding Author: Zabta Khan Shinwari <shinwari2008@gmail.com>

regions. Affordability of the openness is one major hurdle in open access models [9]. Another, concern that arises with open science is the capacity building and support from the highest levels including policy makers. Additional research specific resources may be required, beside infrastructure and staff to ensure a transparent flow and sharing of knowledge [10, 11]. Scientists can be reluctant to share their data as it has emerged from their own ideas and experiments which give them a competitive edge in their scientific domains or circles. Then there are concerns on the anonymity and confidentiality of participants if it's a survey type study [12]. There is a fear among scientists of being scooped off their ideas and further analysis. Scientists endorse the idea of availability of data on request, however, in one study revealed that 73% of the research teams did not complied with the repeated requests [13]. Failure in compliance may have different reasons, either, the raw data is not available, not readable or might have been on a computer which is not in service or damaged etc. There are other issues too, like what if the PI is no longer serving or died [14]. Another aspect of the open data that raises concerns is related to the open data and access to the sensitive information that has a dual use potential. Like through synthetic biology it's now possible to create organisms and genetic engineering could be used to instill some new features in organisms. One of the case that can be cited here is about the synthesis of the horse pox virus [15]. The horse pox virus does not cause disease in humans, but Variola major, another related virus can cause small pox in humans. Some scientists argue that the information conveyed in their publication can be used to create this similar small pox virus which was eradicated in 1980 [16].

Policy making for incentivizing the researchers adapting the open science may be helpful in promoting openness. However, at present, there are no such incentives in place which needs a thoughtful consideration. Researchers opting for open science practices are most likely to publish fewer papers as compared to the researchers going for traditional methods. This will generate a peer pressure, especially on the early career scientists in terms of research productivity and promotion [2]. Therefore, the recognition of open science in the mainstream is important for keeping scientists at par with the peer pressure.

To conclude, open science is inevitable for the transparency, validation, reproduction and replication of research, therefore, needs to be promoted across all domains of science. However, dialogues among the community are required to address the concerns that arises from the open science.

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