

Research integrity

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Background

Good practices in research, including data interpretation, communications of findings, and the translation of results to applications, are desired outcomes expected by funding agencies, the scientific community and the public. However, there are concerns that violations of expected good practices can occur at any point during the process, including at formulation of the research project, conduct of research, and also in the publication of research findings.

Research integrity has been defined as responsible, honest, ethical, professional conduct and management of research. Research integrity must begin from project proposal, during its conduct, and continue even after project completion, including the publication, and translation of findings for application. Any deviation of expected behaviour related to these activities will trigger attention and scrutiny to determine if serious violations have occurred regarding expected integrity and responsibility of those involved in the research process.

Arising from concerns of violations on responsible research, the European Science Foundation (ESF) and the US Office of Research Integrity (ORI), Department of Health and Human Services, convened the First World Conference on Research Integrity in Lisbon, Portugal, on 16 – 19 September 2007, and issued its Report on strategies fostering responsible research and harmonising policies on research misconduct.¹ It encouraged all countries to formulate best research practice guidelines and also procedures for responding to research misconduct. It further recommended that the ESF and ORI should lead in developing a Global Clearing House for Research Integrity, providing information on each nation's policies on research conduct/misconduct, training programmes on responsible research, and related activities and organisational contacts.¹

The Singapore Statement on Research Integrity which was developed at the Second World Congress on Research Integrity, 21 – 24 July 2010 serves as a global

guide for responsible conduct of research.² It sets out the principles of honesty, accountability, professional courtesy and fairness, as well as good stewardship in research activities. A list of 14 responsibilities relating to the above principles for research integrity was officially formulated.

The Montreal Statement developed at the Third World Conference on Research Integrity, 5 – 8 May 2013, in Montreal, added guidelines to research responsibility in relation to cross-boundary research collaboration.³

Scientific Misconduct

The 14 Principles listed in the Singapore Statement on Research Integrity provide the framework for good research governance and the prevention of scientific misconduct. Honesty and trustworthiness in the research process, scientific appropriateness and rigour, as well as adherence to all related regulations including data handling and publication ethics are mandatory, as is the appropriate use of the research findings.

Some common transgressions that the Singapore Statement on Research Integrity address include plagiarism, falsification and/or manipulation of research data, wilful misinterpretation of findings, and publication misconduct.

Plagiarism can occur at the project proposal stage, as well as in publications. At the research proposal stage, submission of a previously submitted and funded project at another institution is reused for the application of new funding without approval or knowledge of the former institution. Self-plagiarism of whole or part of published papers is unacceptable except under special, transparent and defined circumstances. This includes duplication of published papers, even if the original is published in another language.

Falsification of research results can occur during conduct of research or during the publication stage. This includes compromised data integrity, doctored images or pure fabrication of results.

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Publication misconduct includes issues of seniority in authorship, disagreement of authorship, gift authorship, etc. At the extreme situation, papers have been retracted after publication, as the research did not in fact take place. Duplication of publication, in whole or in part, reuse of images, photographs and figures without prior approval are examples.

Misinterpretation of results including misuse of statistical analyses to project a wrong outcome from the data, suppression of research results to suit a particular interpretation are some examples. Misrepresentation of results for various motives can create a powerful negative impression of the researcher involved.

Allegations of scientific misconduct are often triggered after publication of the research findings. In this respect the Committee on Publication Ethics (COPE) has in place, comprehensive guidelines for editors to address these allegations. COPE Guidelines for research, audit and service evaluation provide recommendations for considering scientific robustness, ethical appropriateness, and adherence to relevant laws and regulations during manuscript review.^{4,6}

The social media through blogs have played active roles in monitoring and detecting violations of scientific integrity through review of research publications. The Centre for Scientific Integrity which runs Retraction Watch is one such blog.⁷ Allegations of scientific misconduct have been raised through blogs, and by whistle blowers from within and outside of the researchers' institutions. PubPeer caters to peer-review of published papers.⁸ Scrutiny followed by expressions of concern by these sources have resulted in numerous corrections in or retractions of published papers. Retractions of published papers are frequently based on one or more of the following reasons: duplication, violations in patient consent and data protection (case reports), compromised peer review process, failure to obtain ethical clearance for the study, submission of paper without co-authors' consent, data/and or image manipulation, etc.

Peer review is an important component in the process of determining the scientific and ethical appropriateness of an article submitted for publication in the particular Journal. Sometimes the peer review process is compromised arising from misconduct, even though there are very good guidelines on this important process for reviewers.⁶

It has been stated that most biomedical research results cannot be reproduced. Although poor or compromised peer review and scientific misconduct may be involved, it has been pointed out that only in rare instances is irreproducibility caused by scientific misconduct.⁹ Some reasons for irreproducibility of research results have been explained as being due the inherent variability in research conditions and not necessarily due to inappropriate and inadequate scientific rigour. Thus the editorial decision to publish an article if it has gone through the due process of vetting should be respected; it is left to other researchers to examine, and disprove the claims made.¹⁰

Violations in research integrity can be unintentional or intentional. The former can be minimised through training in research methodology, data analysis, and related skills. The factors leading to intentional research misconduct are more complex and difficult to address. Training, followed by adherence to best practices in research and publication must be in place. Monitoring of research activities as part of good research governance in the organisation will certainly assist in preventing violations. In organisations with diverse culture and ethnic backgrounds of researchers, adherence to best practices, for example, in publication guidelines¹¹, can prevent violations in authorship. The need to produce publications in high impact journals for perceived funding and promotional prospects may entice researchers to compromise research integrity.

Disciplinary Consequences

As stated in the COPE Code of Conduct and Best Practice Guidelines for Journal Editors, it is mandatory

that Editors should always be willing to publish corrections, clarifications, retractions and apologies when needed.⁵

Guidelines on procedures for the investigation of alleged research misconduct and other violations of research integrity must be in place in all organisations carrying out or funding research. In addition, all institutions, including funding bodies must publicise as their official policy that there shall be zero tolerance to scientific misconduct.

The disciplinary action to be taken will depend on the institutional guidelines and the perceived seriousness of the misconduct. This range from corrections to published papers, retraction of papers, and in serious misconduct, even revoking of PhD if the basis of the award is also shown to be compromised, and expulsion from organization. Legal action can be taken if criminal basis can be proven. Other punishment includes banning the offender from applying for and receiving research funds for a defined period from specific funding agencies.

Recommendations

Prevention in breaches of research integrity is recommended at all levels involved in the conduct of research. Training on what constitutes plagiarism and the use of software to detect violations should start at the undergraduate, graduate, and researcher levels. Workshops using case studies to illustrate publication misconduct and the consequences arising from them should be a good platform for this.

An Office of Research Integrity with responsibility to investigate all allegations of violations and to decide

on recommendations for punishment and rehabilitation should be formed in all Institutions and Research Funding bodies. Publicising cases without infringing legal requirements may help to educate those involved in research and help promote a culture of integrity and prevent future potential violations.

Keywords: Research integrity, research practice guidelines, scientific misconduct

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