The Academy of Medical Sciences

Response to the Science and Technology Committee Inquiry on Research Integrity

March 2017

Summary

- The biomedical research community recognises the need to ensure research integrity and to address concerns about reproducibility and increasing retraction rates which can indicate poor research practice. This is essential in order to ensure research is of high-quality and drives improvements in health.
- The main drivers of poor research practice are a lack of training and awareness alongside a reward structure that often incentivises novelty over robustness and research quality.
- Improving research is the collective responsibility of funding bodies, research organisations, universities, journals, publishers, government, professional bodies and researchers themselves.
- Increased training, awareness and better incentives for researchers will drive improvements in research integrity. Efforts are already being made by funding bodies and universities to catalyse changes in research culture. However, the current initiatives are in their infancy and, as is the case with cultural change, it will take time before their impacts are seen.
- We favour the use of guidance and incentives to improve research integrity rather than regulation. The latter could inhibit research by stifling creativity or increasing bureaucracy as a 'one size fits all' approach is not appropriate.

Introduction

1. The Academy of Medical Sciences promotes advances in medical science and campaigns to ensure that these are translated into healthcare benefits for society. Our elected Fellowship comprises of the UK's foremost experts in medical science, drawn from a diverse range of research areas, from basic research, through clinical application, to commercialisation and healthcare delivery.

2. The Academy of Medical Sciences recognises the importance of research integrity to ensure that only high-quality research is supported. The Academy was part of the steering committee in the publishing of the Nuffield Council on Bioethics report on research culture.[1] We also led a joint symposium in April 2015 together with the BBSRC, the MRC and the Wellcome Trust that explored how reproducibility in biomedical research could be improved. The resulting report examined the causes of irreproducibility which are often the result of poor research integrity.[2] This has been followed by the publication of a progress update.[3]

[1] Nuffield Council on Bioethics (2014) The culture of scientific research in the UK. http://nuffieldbioethics.org/wp-content/uploads/Nuffield_research_culture_full_report_web.pdf
[2] Academy of Medical Sciences (2015) Reproducibility and reliability of biomedical research: improving research practice. http://www.acmedsci.ac.uk/viewFile/56314e40aac61.pdf
[3] Academy of Medical Sciences (2016) Improving research reproducibility and reliability: progress update from symposium sponsors. http://www.acmedsci.ac.uk/file-download/41615-5836c0640fd92.pdf

3. Our response examines the causes of poor research integrity and what is already being done to address it, with a particular focus on the role that funders can play.

Extent of the issues which challenge research integrity and their causes

4. The extent of challenges to research integrity are hard to quantify. However, the research community recognises that it is important to maintain good research integrity in order to ensure the research that we and others fund is of high-quality and drives improvements in health. Although it is difficult to quantify the extent of the challenges to research integrity, estimates from surveys find that misconduct and fraud, where data is deliberately fabricated or falsified, are rare compared to poor research practices.[4]

5. There is no single cause of poor research integrity which can be related to poor experimental design, inappropriate analysis, poor research practices and cultural factors such as a highly competitive research environment and the high value placed on novelty and publication in high-profile journals.

6. There are a number of steps which can be taken to support good research integrity. High-quality training will improve awareness of good study design and analysis which make for good research integrity. Changes in culture, where assessment of research and career progression is dependent on robustness of research over novelty and publication in high-profile journals will also incentivise good research practice.

Efforts by stakeholders

7. Efforts to improve the reliability of research is the collective responsibility of all those involved in the research process, including funders, publishers, universities, research institutions, professional bodies and individual researchers – both in the UK and internationally.[5] In the following section, we outline some recent efforts by key players to address these drivers.

Tackling poor training and awareness

8. Rigorous scientific training is essential to prevent and raise awareness of bad practices such as cherry-picking of data, data-dredging[6] and the omission of negative results. The co-hosts of the reproducibility symposium (The Academy of Medical Sciences, BBSRC, MRC and Wellcome Trust) have, since the symposium on reproducibility, made it a condition that the research organisations they fund provide researchers with appropriate training to improve experimental design, research methods and statistical expertise.[7] This would be

[4] Fanelli D (2009) How Many Scientists Fabricate and Falsify Research? A Systematic Review and Meta-Analysis of Survey Data. PLoS ONE 4(5): e5738.
[5] Academy of Medical Sciences (2015) Reproducibility and reliability of biomedical research: improving research practice. http://www.acmedsci.ac.uk/viewFile/56314e40aac61.pdf
[6] Also known as p-hacking, this involves repeatedly searching a dataset or trying alternative analyses until a 'significant' result is found.
[7] Academy of Medical Sciences (2016) Improving research reproducibility and reliability: progress update from symposium sponsors. http://www.acmedsci.ac.uk/file-download/41615-5836c0640fd92.pdf

required for all levels but particularly for PhD students. The BBSRC recently funded an award to develop a five-day annual residential training course on robust research approaches, to be run with 30 students over three successive years. Work is ongoing to identify the types of training already provided and where the gaps are through surveys of PhD students and graduate training leads to refine the content and identify the resources required to deliver training.

Changing research culture and environment

Data-sharing and open access

9. Data-sharing, where the full data set is made available for scrutiny means it can be evaluated by the research community to determine the validity of its interpretations. Funders can drive changes in data-sharing practices because they can make it a condition of their funding that data be made accessible. The Academy of Medical Sciences, BBSRC, MRC and Wellcome Trust have all taken steps to improve openness and data sharing.[8] Grant applications to these funders must now set out plans regarding data sharing and data management. Wellcome and the Research Councils have developed a Concordat on Open Research Data that sets out a series of clear and practical principles to help ensure that research data gathered and generated by members of the UK research community are made openly available for use by others wherever possible.[9]

10. In publications that result from large collaborations, the assignment of an individual author to their contribution is often unclear. Clearer ownership of work is a means of ensuring accountability and may dissuade researchers from poor research integrity. The Academy's Team Science report makes the recommendation that standardised contribution information frameworks such as CRediT should be used for all research outputs.[10]

Incentivising research integrity through career progression

11. In academic research, career structure incentivises novelty and publication in high-profile journals over rigour and reproducibility.[11] Unfortunately, the pressure to publish significant findings can lead researchers to adopt bad practice.

12. To shift the culture away from the current reward system, many funders including the Academy of Medical Sciences, BBSRC, MRC and Wellcome Trust are making it a priority that panels and chairs do not rely on journal impact factors as a measure of an individual researcher's track record or to judge the robustness of their work, and will regularly review their induction processes and guidelines for panel members.

Changing the research environment

13. We have already highlighted the positive influence on research culture that can be exerted by funders. The next Research Excellence Framework (REF) process could also be an

[8] Academy of Medical Sciences (2016) Improving research reproducibility and reliability: progress update from symposium sponsors. http://www.acmedsci.ac.uk/file-download/41615-5836c0640fd92.pdf
[9] Concordat on open research data.
[10] Academy of Medical Sciences (2016) Improving recognition of team science contributions in biomedical research careers
[11] Academy of Medical Sciences (2015) Reproducibility and reliability of biomedical research: improving research practice.

opportunity to catalyse further changes in research culture. The REF 2021 could do so by assessing institutional measures that aim to promote good research and enhance the robustness and reliability of research. These could be reflected in Environment assessments detailing how institutions support high-quality research, as recommended in Lord Stern's recent review of the REF.[12]

14. Researchers in industry are not subject to the same pressures to publish novel findings as those in academia. To take forward a research idea in industry (e.g. target validation), reproducibility is paramount. Encouraging industry-academia collaboration can allow cultural exchange to occur. One example is the existence of consortia (e.g. Milner Therapeutics consortium[13], Dementia Discovery Fund[14]) where multiple companies work alongside academics in collaborative projects. The Academy has long promoted the value of industry-academia mobility through the work of its FORUM and careers policy work.[15] Many funders wish to support joint work between academics and industry by, for example, funding and provision of short-term exchanges of students and research staff.

Guidelines to support research integrity

15. Any guidelines to ensure good research integrity would need to be tailored for different disciplines, a one-size-fits-all approach is not appropriate. Any measures to improve research integrity should be developed in consultation with the research community and evaluated to ensure that they achieve the desired effects. They should not unnecessarily inhibit research, stifle creativity or increase bureaucracy.

16. Due to the diverse requirements and specialist expertise needed to assess and support good research integrity and good research practice, self-regulation by the research community is likely to provide the best mechanism for ensuring good practice in research. The Academy supports the use of guidance, for example, the Code of Practice for Researchers published by the UK Research Integrity Office (UKRIO), and supporting researchers to encourage good research practice and integrity, rather than a regulator.

17. Ways in which the research community are actively working to improve research integrity are novel or still embedding and it is too early to assess their impact on good research practice and ability to promote research integrity.

Concordat to support research integrity

18. Codes of conduct, such as the concordat to support research integrity from UUK, are helpful to encourage high-quality science and remind researchers of appropriate research practices.[16] The UK funding bodies require that the institutions that they fund sign up to

[12] Stern N (2014) Building on Success and Learning from Experience: An Independent Review of the Research Excellence Framework.
[13] http://www.milner.cam.ac.uk/consortium
[14] http://www.theddfund.com/
[15] Academy of Medical Sciences (2007) Research careers in the biomedical sciences: promoting mobility between academia and industry.
[16] Universities UK. (2012) The concordat to support research integrity

this concordat as a condition of funding. The Academy of Medical Sciences is a supporter of this concordat.

Improving peer review

19. Journals and editors have a role to play in making the culture more conducive to research integrity. Valuing validity of findings over impact and novelty as highlighted by the *Select Committee's Peer Review in scientific publications* report is paramount.[17] Alternative peer review models namely protocol pre-registration and post-publication peer-review (example: Pubpeer[18]), have also been suggested and are being trialled. Protocol pre-registration may not be applicable to all aspect of biomedical science (e.g. exploratory analysis) but has seen some success in ensuring good practice. Post-publication peer review, where journals provide online comments, are still rare but have been received positively overall.

20. These are new approaches that will require time to assess to ensure that they support good practice and lead to improved research integrity. This needs to be supported by increased awareness of the tools that are available, as well as ensuring researchers are able to allocate time to it.[19]

Academic responsibility

21. While the research environment is driven by the policies of funders, institutions and publishers, researchers themselves also have a duty to be rigorous and require high standards of themselves and the teams they work in or lead. In order to achieve this they must be provided with adequate support on research integrity, including through continued access to services like those provided by UKRIO which offers independent advice and resources to researchers relating to research integrity.

22. The Nuffield Council on Bioethics report also highlighted the importance of mentoring which is another way that academics can catalyse changes in culture. Participation in schemes such as the Academy of Medical Sciences mentoring scheme should be recognised and encouraged as senior researchers can use this as an opportunity to reinforce good research practice and culture to their mentees.[20] Finally, researchers themselves can choose not to publish in journals that do not support good research integrity.

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[17] House of Commons Science and Technology Committee (2011) Peer-review in scientific publications
[18] https://pubpeer.com/
[19] Academy of Medical Sciences (2015) Reproducibility and reliability of biomedical research: improving research practice.
[20] https://acmedsci.ac.uk/grants-and-schemes/mentoring-and-other-schemes/mentoring-scheme

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