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Why and how I have adopted Open Research practices

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SUMMARY

Writing pre-specified analysis plans and registering them online has become an integral aspect of my workflow. This way of working can reduce biases (such as publication bias and 'p-hacking'), ensure the analytical approach is based on the most rigorous methods and streamlines the production of a scientific manuscript. As well as this, I have published papers that describe data, including data that I have derived with the aim that this supports open science through data sharing with the wider community. I am an avid sharer of methods and code and post all of my research on pre-print servers.

What did you do?

I have adopted open research practices by mostly using the tools available on the Open Science Framework (OSF) with a particular focus on writing detailed pre-specified analysis plans before commencing analyses. The analysis plans consist of an introduction including a brief overview of the literature and the rationale for the proposed project. I would then describe the data we intend on using and outline the statistical analyses. These steps are performed alongside discussions with supervisors and collaborators and are then agreed upon before commencing analyses. I have disseminated my analysis plans widely via social media. I have also used social media to encourage open collaboration, including for possible replication. Doing this also allows me to gather comments and insights on the methods at the study design stage. I recognise that it is entirely normal for things to change throughout a project, for example in response to co-authors or reviewers. I add dated changes to the analysis plan and the rationale for them. I have been active within my research team, the Integrative Epidemiology Unit (IEU) and more broadly in promoting the value of published analysis plans and provide support to colleagues to do this.

I have written two data notes and published these in Wellcome Open Research (WOR). Articles published in WOR benefit from rapid open access publication and a transparent peer-review process. These papers include descriptions of data that I have derived through time-consuming and labour-intensive processes. Publishing these data notes allows other researchers to access and use unique data on all congenital anomalies in the Avon Longitudinal Study of Parents and Children (ALSPAC) study and all metabolomics data in the Born in Bradford (BiB) study (see supporting information). 100% of my published / submitted research has been placed on WOR or a preprint server so that it is immediately available (excluding one manuscript which was accepted for a special issue in a journal and thus rapidly reviewed and published)

Why did you do it?

After reading several papers and books describing the reproducibility crisis, which stems from several issues including publication bias, I decided to make use of the tools that are already available to help fix this problem. I soon realised that this way of working is not only good for science in general, but it could also streamline my workflow from project planning, to analyses, to publication. Confounding is a problem in epidemiology. Pre-specifying confounders in my

analysis plans based on expertise and knowledge (i.e. not on data availability), enables me to develop appropriate sensitivity analyses and interpret results in the context of likely residual confounding.

How did you do it?

I created a profile on OSF and place descriptions and pre-specified analysis plans for all of my projects there. As I gained confidence, I promoted this approach widely. I have attended courses and journal clubs to learn more about reproducibility in science. Currently, I am trying to learn more about GitHub and how this could be incorporated into my workflow. My aim here is to share my analysis code more widely and openly.

What barriers / challenges did you have to overcome?

Writing and publishing detailed analysis plans before starting any analyses was promoted by my supervisor but was different from the way many of my peers and collaborators work. Once they were on board with the idea, I think they immediately saw the benefits, including having clear rationales for methods, and being able to discuss these with co-authors and reviewers. This is evident in that several colleagues have now started to adopt this approach. It can still be difficult for me as a PhD student to challenge reviewer suggestions that I feel are inappropriate, but I learn from these experiences. Some journals will not accept manuscripts that are posted on preprint servers; I target journals that will and that more broadly support open science.

What does it mean for you and your research?

For me, it is very important that my research is clear, transparent and accessible to all, no matter what the results show. I want to feel confident when I publish my work that if someone else were to conduct the study, they would produce the same results. Few epidemiologists get the opportunity to collect data nowadays as there is so much available to us. I wanted to learn about data collection and be able to 'give back' to the scientific community.

How might your findings / approach help other researchers?

As mentioned, other researchers that I have worked with have started including pre-specified analysis plans into their work practices. This is a step in the right direction, and I believe that this approach will gain further momentum in the future. Universities and institutions are beginning to recognise Open Science when hiring staff as opposed to just focusing on publications with significant results in high-impact journals (which can encourage publication bias, p-hacking and other poor practices). The more this is happening, the more researchers will begin to incorporate Open Science practices into their work. I believe we are at the beginning of a major positive shift in the way science is conducted which is exciting to be a part of.

Supporting evidence

Link to examples of pre-specified analysis plans:

<https://osf.io/82vq6/> - This link takes you to my Open Science Framework page where all of my projects can be viewed.

Links to two data notes describing data I have derived and am promoting widely for others to use:

1. <https://doi.org/10.12688/wellcomeopenres.16339.1> - ALSPAC congenital anomalies.
2. <https://doi.org/10.12688/wellcomeopenres.16341.1> - BiB Metabolomics.

Link to a summary of my publications including preprints and WOR articles:

<https://scholar.google.com/citations?user=uPqGAMoAAAAJ&hl=en>

Comment from supervisor:

I am delighted to add a final comment to this application (done after Kurt had a final draft). Kurt has been exemplary in contributing to and promoting open science. His mature, intelligent, collaborative approach to open science has inspired others to be more open. I have also learnt from his approach.