
Article:
Uttley, L. orcid.org/0000-0003-4603-9069 (2024) Research culture's role in contributing to research waste: lessons from systematic reviewlution. Exchanges: The Interdisciplinary Research Journal, 11 (3). pp. 114-125. ISSN 2053-9665

https://doi.org/10.31273/eirj.v11i3.1539

Research Culture's Role in Contributing to Research Waste: Lessons from Systematic Reviewlution

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Funding: See Acknowledgments.

Editorial review: This article has been subject to an editorial review process.

Abstract

Systematic reviews are the gold standard of evidence syntheses and underpin decision making which affects outcomes for patients globally. A research integrity project funded by the UK Research and Innovation Medical Research Council, entitled 'Systematic Reviewlution' aimed to understand and document problems with these highly cited and influential articles, which are often being published at a rate that outpaces primary clinical research. This living systematic review found 485 articles in the first iteration, documenting 67 discrete problems relating to the conduct and reporting of published systematic reviews. These problems potentially jeopardise the reliability or validity of systematic reviews. A variety of institutional factors are likely fuelling the publication of substandard systematic reviews and these factors are representative of issues affecting the entire evidence ecosystem. These factors are discussed in reference to themes identified through this meta-meta-meta-research initiative. The publish or perish perverse academic reward system is fuelling a lack of reproducible research. Paradoxically, the reputation of systematic reviews as a high-quality form of evidence is leading to an overproduction as they are likely seen as a certainty for publication. Wider issues of the influences of research culture generally, the fallibility of peer review and the importance of diversity and representation in research teams are emphasised.

Keywords: research culture; systematic reviews; meta-research; perverse academic incentives; research integrity; research waste

Background

Research waste can cover several scenarios. It can refer to:

i. publication of redundant, poor quality, unreliable or invalid research (**Glasziou, 2018**).

ii. failure to publish or disseminate the results of research (**Chalmers, 2009**).

iii. inefficient or unnecessary use of resources in the research process, including time, funding, and human efforts (**Zheutlin, 2020**).

iv. failure to use earlier research when preparing new research (**Robinson, 2011**). Marriage tactile

Systematic reviews, whilst regarded as the pinnacle of the evidence based hierarchy, have previously been noted to contribute to research waste by promoting the citation of underpowered trials (**Roberts, 2015**), for being susceptible to fraud (**Marret, 2009**), for being low quality (**Hedin, 2016**), and for failing to be complete (**Créquit, 2016**). Due to the vast number and variety of papers highlighting such problems with systematic reviews across different journals and different specialities, a research integrity initiative was created to join up a conversation regarding limitations of systematic reviews (**Uttley, 2023**). This project was funded by a Career Development Award to the primary author from the UKRI Medical Research Council and collaborated globally with experts in evidence synthesis to create a living systematic review of papers highlighting flaws, limitations and problems with published systematic reviews. The aim of this project has been to categorise the many problems levelled against systematic reviews by previous authors, by conceptually grouping them to amplify and learn from the work of previous authors in this field. The problems are categorised by four domains, which are hallmark characteristics of good systematic reviews being: i. Comprehensive; ii. Rigorous. iii. Transparent and iv. Objective. The published paper and associated website for this living review was created as a resource to help those who do, and use, systematic reviews to improve future systematic review conduct (**Systematic Reviewlution, 2024**).

The methodology of this project was registered and has been described in full elsewhere (**Uttley, 2023**).[i] In the first iteration of this review, sixty-seven discrete problems were found from 485 included articles that could potentially harm the reliability or validity of systematic reviews.

In other work examining the growth of systematic reviews, research shows that the number of systematic reviews being published is increasing year upon year (**Fontelo, 2018**) and outpaces primary clinical research in some areas (**Niforatos, 2020**). More worryingly, the number of meta-analyses

being published, which may not have been conducted in the context of a systematic review, is also increasing. What are the possible justifications for conducting meta-analyses that do not attempt to use the comprehensive and transparent methods that systematic reviews require? What is the value of a meta-analysis which has not been entirely exhaustive in the search for studies and rigorous in the methods of analysis? Meta-analysis is a statistical technique that can be performed with limited or no statistical expertise using open source software and as such can be conducted very rapidly. A best practice systematic review however is a time-intensive research project and requires the input of multiple methodologists, adherence to reporting and methodological guidelines, pre-specification and ideally, registration. Given that the risk of selection bias is high in primary trials that are not pre-registered, the same risk exists when producing pooled treatment effects by combining studies in a retrospective meta-analysis. In any case we are witnessing large numbers of meta-research studies being published at an exponential rate (**Ioannidis, 2016**).

Systematic reviews, like other meta-research study designs, are particularly vulnerable to being conducted and published hastily because they are desk-based research, which do not require approval through research ethics committees as they make use of existing published papers. Indeed, evidence syntheses currently represent a quicker route to publishing empirical research as they do not require the painstaking acquisition of primary data, which requires substantial time, planning and (preferably), preregistration. The notion that secondary data analyses should be automatically exempt from applying for ethical approval has more recently been challenged in consideration of cases where such desk-based research may raise sensitive issues and could cause harm (**Chatfield, 2023**). This includes emphasising the distinction between the need to seek ethical approval and ensuring that appropriate consideration of potential ethical issues raised by secondary data analyses is given by the research team. Meta-research, if seen as a swift route to publication, may be more susceptible to being conducted in haste and this is increasingly evident in recent papers included in the update to Systematic Reviewlution. Despite the wide availability and development of best practice guidelines for systematic review reporting and methodological conduct, citation of or supposed adherence to these checklists are not protective of systematic review integrity (**Dai, 2022; Innocenti, 2022; Nguyen, 2022; Bojcic, 2023**).

Lack of Planning and Registration in Systematic Reviews

Whilst preregistration of systematic reviews by way of protocol development and publication is best practice, it is not strictly necessary in order to publish a systematic review in all academic journals. Indeed, Systematic Reviewlution has found that the most prevalent problem in systematic reviews by far is the lack of protocol registration, with 104 articles highlighting a lack of systematic review protocols in the most recent update to the living review. Moreover, recent research highlights that even systematic reviews that are in fact registered on the PROSPERO database for health-related systematic reviews are often already in progress, meaning that the methods may not been registered *a priori*, or before work begins (**Riley, 2023**). Registration in these cases can cynically be thought of as route to facilitate publication in a peer-reviewed academic journal.

Registration Does Not Guarantee Best Practice Conduct

Unfortunately, research finds that preregistration of systematic reviews in PROSPERO does not necessarily correlate with high methodological or reporting quality. Whilst registration is generally associated with better quality than unregistered reviews (**Ge, 2018; Sideri, 2018**), further meta-epidemiological research highlights that many registered reviews have critically low methodological or reporting quality (**Khaleel, 2019; Riley, 2023**). Systematic reviews are often found to have deviated from their original protocol and that this deviation in methods is frequently not updated in the protocol nor is it justified or the resulting journal paper (**Riley, 2023**).

Duplication and Redundancy in Systematic Reviews

Registration of reviews also does not guarantee that registered review questions are unique and research shows that duplication of review topics in PROSPERO (**Beresford, 2022**) and Epistemonikos database (**Whear, 2022**) is common. Duplicated systematic reviews could, in theory, serve as study validation if used as replication research for identical review questions (**Vachon, 2021**), preferably with aims for improved methodological and reporting conduct than previous reviews. However, analysis of original, replicated and excessive replication of systematic review questions finds little value is added when those duplications continue to suffer from low methodological quality and high risk of bias (**Chambers, 2014; Chapelle, 2023**). Systematic reviews with identical review questions have also been noted to contain conflicting results (**Rosen, 2016; Pagel, 2021**). Redundant systematic reviews published after newer ones have been noted to add nothing new or useful (**Siontis, 2018**). Systematic reviews have been found to be poorly justified in the scope,

and fail to demonstrate, awareness of relevant work by citing similar existing or ongoing reviews (**Poolman, 2007; Weir, 2012; Pieper, 2014; Riva, 2018; Hacke, 2020**). There are also many registered systematic reviews that are never completed or published, termed as 'zombie reviews' (**Andrade, 2017; Runjic, 2019**).

The Role of Research Culture in Systematic Review-Related Research Waste

In an academic culture that requires and rewards frequency and number of publications for research careers with longevity (**Biagioli, 2020; Hsing, 2023**), the so-called publish or perish mantra which plagues researchers' careers is a likely contributor to the proliferation of systematic reviews which are reputable in name but not necessarily in delivery.

Questionable research practices can be employed from the most junior to senior of academics across disciplines when promotion, contract stability and reputation depend on authorship of academic journal papers (**Edwards, 2017; van de Schoot, 2021**). Time-poor academics are required to peer review manuscripts claiming to be systematic reviews, but diligent peer review is an increasingly scarce commodity when there are competing pressures to conduct one's own research and win funding (**Schulz, 2022**). There is a lack of clarity for fact-checking guideline checklists and detecting questionable research practices between editors and peer reviewers (**Ekmekci, 2017**). A research environment built on a profit-making journal industry with an increasingly growing grip from a few commercial publishers (**Larivière, 2015**) is the perfect storm for researchers, clinicians and industry to seek opportunities for easy publications. In this climate of research culture, systematic reviews are the unfortunate likely candidates to be seen as a dead-cert for publication in academic journals.

The Role of the Research Team

Ultimately, a research project is governed by the team who design and conduct it and the influence of systematic review team on the resulting output has been highlighted previously (**Uttley, 2017**). Additionally, research teams need to be sufficiently diverse and to have consulted stakeholders and people with lived experience to ensure they conduct representative research. Disparities such as gender representation across science more generally are likely fuelled by research culture (**Ross, 2022**; **Khan, 2019**; **Hagan, 2020; Mahony, 2020; Johnson, 2021**). This disparity shows up in systematic review author teams, which often lack diversity (**Qureshi, 2020; Dhali, 2022; Rathna, 2023**). A lack of diversity has recently been found to be correlated with a lack of reporting of equitable characteristics of the primary studies in the systematic reviews

(**Antequera, 2022**). This indicates that homogenous research teams are less able to produce research for diverse populations.

Ethics of Conducting Substandard Systematic Reviews

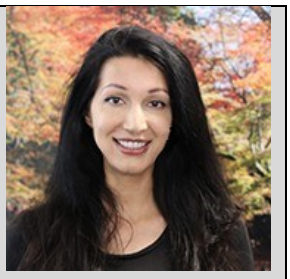
We would not endorse a clinical trial to commence without ethical approval. We want to know that the trial investigators have some competence in conducting and reporting research involving human participants. In secondary research however, the adage is 'no ethical approval is needed as the review only uses existing datasets'. However, when a team of researchers decides to do a systematic review using existing patient data, without the funding, the resources, the expertise or statistical competence within the team, or the knowledge of how to perform comprehensive literature searches, is it ethical for such a team go forth to combine and publish results that could potentially distort the evidence base? It may be argued that ensuring appropriate skills, time and resources are allocated to systematic reviews is vital to result in reliable and valid research answers. In addition, despite the apparent freedom that secondary evidence syntheses represent from the process of obtaining ethical approval, it may be judicious for researchers, peer reviewers and journal editors to contemplate whether there could be ethical issues arising from meta-research projects that warrant ethical consideration prior to and during conduct.

Accountability

It is the responsibility of researchers, peer reviewers, publishers and editors to stem the tide of research waste from systematic reviews and other meta-research products from polluting the evidence ecosystem. Meta-research projects should not be conducted lightly. They should be pre-planned; they should have a protocol. As a minimum that protocol needs to be publicly accessible and date stamped prior to starting the research. Ideally, the protocol would be registered on a database of systematic reviews and subject to some form of relevant peer review, including the views of patients, clinicians and stakeholders where appropriate. Where systematic review authors have not implemented the minimum standards, peer reviewers and editors should question the scientific value of adding such manuscripts to the permanent academic record. Good science takes time, resources, diverse expertise and forethought. It could be argued that the rest is just waste.

Acknowledgments

This research was funded by a career development award from the UK Research and Innovation, Medical Research Council to Lesley Uttley (MR/T009861/1).



Lesley Uttley is Senior Research Fellow at the University of Sheffield, working in the field of meta research scrutiny. After a PhD in Psychology and 10+ years experience in systematic reviews, Lesley was awarded a fellowship by the UKRI Medical Research Council (2020-2024) to investigate the reliability and validity of published systematic reviews- the gold standard in evidence syntheses. This living research integrity initiative joins up the conversation about systematic review problems to help people doing and using systematic reviews strive for best practice. She advocates considering how human influences such as researcher allegiances, conflicts of interest, and research culture, can impact seemingly objective research projects.

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To cite this article:

Uttley, L., 2024. Research Culture's Role in Contributing to Research Waste: Lessons from Systematic Reviewlution. *Exchanges: The Interdisciplinary Research Journal*, 11(3), 114-125. Available at: https://doi.org/10.31273/eirj.v11i3.1539.

Endnotes

[i] Open Science Framework registration https://osf.io/2hmv9/ PROSPERO registration CRD42020181371.