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LIVING REVIEWS/LIVING GUIDELINES

Yet another problem with systematic reviews: a living review update

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Abstract

Background: In February 2023, the *Journal of Clinical Epidemiology* published 'The Problems with Systematic Reviews: A Living Systematic Review.' In updating this living review for the first time a new problem and several themes relating to research culture have emerged.

Methods: Literature searches were rerun to identify articles published or indexed between May 2022 and May 2023. Thematic analysis coded articles and problems across four domains of systematic review conduct (1. comprehensive, 2. rigour, 3. transparent, 4. objective).

Results: One hundred fifty-two newly included articles bring the total number of relevant articles to 637. A new problem (the lack of gender diversity of systematic review author teams) brings the total number of problems with systematic reviews up to 68. This update also reveals emerging themes such as: fast science from systematic reviews on COVID-19; the failure of citation of methodological or reporting guidelines to predict high-quality methodological or reporting quality; and the influence of vested interests on systematic review conclusions. These findings coupled with a proliferation of research waste from ''me-too'' meta-research articles highlighting well-established problems in systematic reviews underscores the need for reforms in research culture to address the incentives for producing and publishing research papers. This update also reports where the identified flaws in systematic reviews affect their conclusions drawing on 77 meta-epidemiological studies from the total 637 included articles. These meta-meta-analytic studies begin the important work of examining which problems threaten the reliability and validity of treatment effects or conclusions derived from systematic reviews.

Conclusion: This living review has captured an emerging theme in the published literature relating to the composition of the review author team and highlights a potential effect on the equity reporting of the systematic reviews. We recommend that meta-research endeavors evolve from merely documenting well-established issues to understanding lesser-known problems or consequences to systematic reviews.

Keywords: Systematic review; Research integrity; Research culture; Author influence; Research team diversity; Metaresearch

1. Introduction

Systematic reviews, when done well, are the gold standard in evidence syntheses. However, published systematic reviews have previously been found to suffer from 67 discrete problems through a comprehensive analysis of 485 metaresearch and editorial academic articles, compiled in a living systematic review (''Systematic Reviewlution'' www.systematicreviewlution.com) [1]. The primary aim of this article is to describe insights and emerging themes identified from newly published literature in the living review update.

A secondary goal is to determine the extent to which these identified issues impact the overall conclusions of systematic reviews. Problems which can potentially alter conclusions indicate that the problem should be regarded as severe, as they may jeopardize the reliability and validity

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What is new?

Key findings

- An update of the living systematic review brings the total problems with published systematic reviews up to 68.
- Themes derived from 152 newly included articles highlight the influence of research culture on the systematic reviews being produced.
- Metaresearch articles which describe well-established problems in systematic reviews, but are not conducted comprehensively, rigorously, transparently or objectively themselves, are proliferating.

What this adds to what is known?

- Lack of gender diversity in review authorship teams influences whether research teams report equity characteristics.
- Fast science; research waste; and vested interests influence published systematic reviews and academic papers are being produced which do not represent the rigor that systematic reviews should uphold.
- Metaresearch publications which scrutinize systematic reviews are mostly produced by research teams from the global west and China.

What is the implication and what should change now?

- Diverse research workforces and teams of authors are needed to produce research which represents real-world populations.
- While the strong incentive to produce academic journal papers in academia remains, researchers will continue to publish flawed systematic reviews and redundant metaresearch papers.
- Metaresearchers are encouraged to ensure future research endeavors in this field build upon what is already well-established to continually evolve and improve the reliability and validity of future systematic reviews.

of systematic reviews. Metaepidemiological research included in Systematic Reviewlution examines this by analyzing samples of systematic reviews to assess whether specific problems affect the summary treatment effect of the studies included. In particular, some replicate or modify methodological strategies, such as including unpublished trials, using different analytical techniques like metaregression, or replicating meta-analyses with alternative statistical approaches to see if these changes influence summary effect estimates. Furthermore, research may assess whether the observed changes in results significantly impact the overall qualitative conclusion or direction of effect of the original systematic reviews. Metaresearchers also focus on methodological and reporting characteristics that correlate with specific problems, such as declared conflicts of interest or sponsorship bias, to determine if these factors correlate with favorable review conclusions or exaggeration of results in systematic reviews.

The living systematic review underpinning this article (www.systematicreviewlution.com) organizes these identified problems thematically to guide improvement in future systematic reviews. In addition to sharing new themes emerging from studies included in the first update, this article also aims to highlight which problems documented may affect systematic review conclusions.

2. Materials and methods

The first iteration of this living systematic review fully describes its underlying methods [1]. Two reviewers (LU & LF) consistently conducted study selection, data extraction, and data synthesis in alignment with the initial version of the living review.

2.1. Literature searches

Update searches were run on 22 May 2023 covering the period from May 2022. Sources searched include MEDLINE, Embase, Science Citation Index, Social Sciences Citation Index, Library and Information Science Abstracts, Cochrane Central Register of Controlled Trials, Cochrane Database of Systematic Reviews and Campbell Systematic Reviews. All search strategies are provided in the supplementary appendix.

Literature searches for this living review will be manually reviewed every 6 months by the project's information specialist (LF) and will be rerun every 12 months until December 2026.

2.2. Data collection and analysis

This living review update reports the number of newly included articles and new problems identified including qualitative themes from recent problems with systematic reviews. Further this article highlights articles that assess how identified problems impact the interpretation and conclusions of systematic reviews.

3. Results

Literature searches yielded 7935 citations after duplicates were removed (see Fig. 1). Screening of titles and

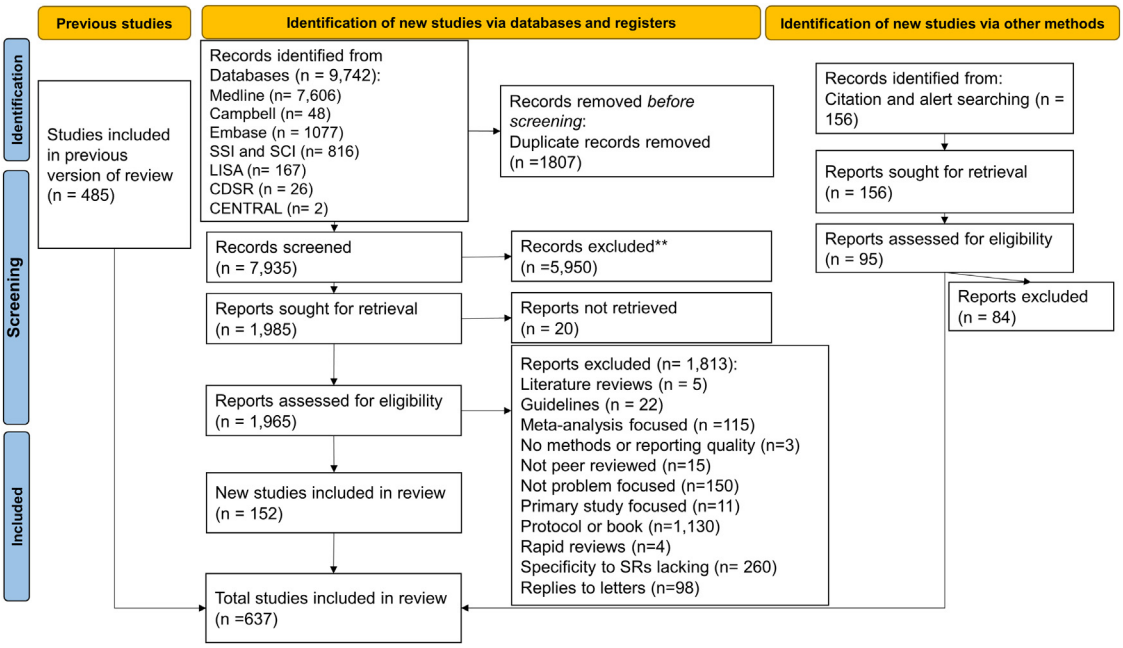

Figure 1. PRISMA Flow diagram of identification and screening of articles included in the first update of the living systematic review.

abstracts led to 1965 full-text reviews with 152 articles included. An additional problem—the lack of diversity among review authorship teams was noted in newly added articles. This problem classified under "objectivity" raises the total number of problems in systematic reviews up to 68.

3.1. Themes emerging from newly included studies highlighting problems with systematic reviews

Themes relating to methods or clinical specialty, as captured in the author keywords of the newly included articles, are depicted in Figure 2.

3.2. Review team composition and the effects on review reporting

Recently included metaresearch examines gender representation in teams of systematic review authors. Separate analyses of Cochrane reviews found that three-quarters of first authors of gastroenterology reviews [2] or any authors of general surgery reviews [3] were male. While analysis of systematic reviews in eyes and vision find approximately equal representation of women and men in Cochrane reviews, representation appears markedly lower for women as corresponding authors than other positions in non-Cochrane reviews [4]. Authorship team diversity is not just a problem of gender representation in systematic review teams but also appears to affect the conduct of systematic reviews. A metaepidemiological analysis of Cochrane reviews found a correlation between the reporting of gender in the included studies with the review's authorship gender. Presence of female authors in Cochrane reviews (either first or last author) was correlated with reporting data regarding sex from the included studies in at least one of the review sections than reviews with no female author [5].

3.3. Fast science and research waste

Good science usually takes times but the COVID-19 pandemic exemplified a growth in "fast science." Recent articles added to the living systematic review indicate an abundance of systematic reviews in the field of COVID-19 with critically low methodological and reporting quality [6], duplication and inconsistency [7], error [8], lack of registration [9], lack of certainty of evidence [10] and perpetuation of poor quality evidence or retracted studies [11]. New studies included in this update highlight further contributions to research waste from redundant systematic reviews. An analysis of 144 systematic reviews in acute venous thromboembolism found that two-thirds (67.7%) equated to excessive replications (duplications) of existing systematic reviews [12].

3.4. Citation of methodological and reporting guidelines is not protective of review quality

Newly added articles strengthen the existing problem that citation of, and in some cases, adherence to, reporting or methodological guidelines for systematic reviews are not protective of flawed or biased reviews. Analysis of

Figure 2. Wordcloud frequently ascribed keywords for the included articles identified between 2022 and 2023, indicating problems with published systematic reviews.

adherence to PRISMA (2009) guidelines from a random sample of 300 systematic reviews found no evidence that using a reporting guideline resulted in systematic reviews being more completely reported than reviews not using a guideline [13]. Further most systematic reviews reporting adherence to AMSTAR 2 had critically low methodological quality in a cross-sectional metaresearch study [14]. However, higher adherence to PRISMA (2009) guidelines in systematic reviews published in rehabilitation journals was found to correlate with lower risk of bias indicating that reporting guidelines can still be a helpful indicator of good conduct in systematic reviews [15]. Published Cochrane reviews continue to be scrutinized in both editorial and empirical articles [16]. For metaresearchers, Cochrane reviews provide a readily available sample of systematic reviews which can be obtained without time-consuming literature searches and therefore papers which scrutinize their conduct and reporting are inevitable. Cochrane reviews require adherence to methodological and reporting guidelines and are seen as the gold standard for reviewing evidence of interventions. Therefore, editorials and metaresearch studies that find flaws in the conduct of Cochrane reviews do not bode well for non-Cochrane systematic reviews, which are not usually held to the same standards and requirements for publication by journal editors and peer reviewers.

3.5. Vested interests

The personal interests of systematic review team authors have been investigated for potential influences on systematic review results. Systematic reviews of vaccines with industry sponsorship were significantly correlated with lower methodological quality than reviews of vaccines without industry funding [17]. Systematic reviews in alcohol and cardiovascular disease authored by individuals with prior industry funding report protective effects of alcohol, broader outcomes such as ‘‘cardiovascular disease,’’ and are published in broader general medical journals, as opposed to cardiology journals, which are much more heavily cited. Reviews with no prior industry funding yield mixed (protective, inconclusive or no protective effects) findings, report outcomes that are more specific and are published in field-specific journals [18].

An association between author conflicts and the favorability of the reviews’ conclusions toward the treatment group was found in systematic reviews of glaucoma interventions conducted by at least 1 author with an undisclosed conflict of interest [19]. Other research studying reviews of erectile dysfunction and opioid use disorder have not found a relationship between conflicts of interest and favorability of review conclusions but did find that reviews declaring no conflicts of interest in the review team contained

undisclosed conflicts of interest as identified by the study authors [20,21]. Editorial bias, which represents a nonfinancial conflict of interest was also noted to be undisclosed by Cochrane review authors who were also editors of the corresponding Cochrane Review Group [22].

3.6. Metaresearch production from the Global West and China

The most prolific countries to publish Cochrane systematic reviews are higher-income nations such as the USA, China, the UK, and other European countries [2–4]. But inequity in global representation is also evident in metaresearch of systematic reviews through a continued proliferation of metaresearch studies scrutinizing published systematic reviews from the Global North and West. Low- and middle-income countries have much lower representation in studies questioning the research integrity of systematic reviews [2,3]. A choropleth map indicating the frequency of all 637 included articles that assess shortcomings of systematic reviews following this update is presented in Figure 3.

3.7. Impact of the problems on systematic reviews

Most of the 637 articles included in this review primarily describe observations on the conduct or reporting of systematic reviews. However, some articles go further, assessing the correlations, consequences or impact of these problems on their sample of systematic reviews. During data extraction, we identified 77 articles that examined whether the problem/s highlighted affected the interpretation, treatment effect or conclusion of the systematic reviews. Of these, 55 articles concluded that the problems likely impacted the interpretation of the systematic reviews assessed. Table 1 shows a breakdown of study designs from the 637 included articles, including citations of studies which performed this further analytical step on systematic review samples. Definitions and documentation of all included articles are available from www.systematicreviewlution.com.

The 55 included articles which found that the interpretation of systematic reviews was impacted were associated with 40 problems, which are depicted in Figure 4.

Descriptions of the particular effects from systematic review problems described in the included articles obtained through data extraction, are provided in the supplementary appendix.

Table 2 lists problems that the 637 included articles have not formally analyzed to assess their potential impact on systematic review conclusions.

4. Discussion

This living research project aims to document existing and emerging problems with systematic reviews to

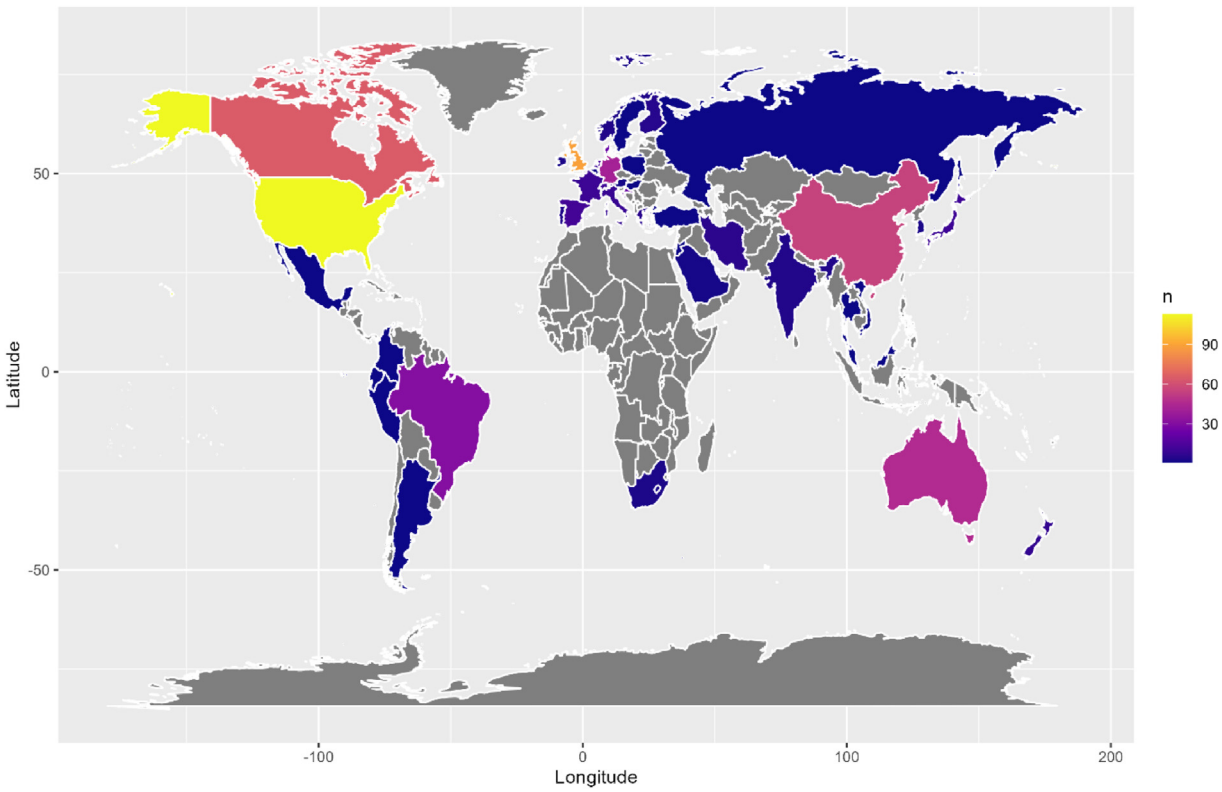

Figure 3. Choropleth map of included article frequency by country.

Table 1. Included articles that assess the impact or correlation of problems on the reliability or validity of the systematic reviews sampled

Study design and number of included articles (% of all included articles)	Number of articles examining whether the problems impacted the treatment effects of the systematic reviews	Number of articles finding that the problems led to changes in the interpretation of the systematic reviews
1. Cross-sectional survey/Methodological systematic review 444 (70%)	17[18],[23–39]	12[18,23,24,26,28–31,36–39]
2. Metaepidemiological analysis 46 (7%)	36[19–21],[40–72]	25[19,41–44,50–55,57–60, 62–66,68–72]
3. Inter-rater reliability study 13 (2%)	4[73–76]	4[73–76]
4. Survey/questionnaire 15 (2%)	2[77,78]	2[77,78]
5. Small analytical study 7 (1%)	4[79–82]	4[79–82]
6. Nonsystematic literature review 14 (2%)	5[83–87]	4[83–85,87]
7. Discussion piece 29 (5%)	2[88,89]	2[88,89]
8. Comment/letter 69 (11%)	6[90–95]	2[91,93]
Total = 637 (100%)	77	55

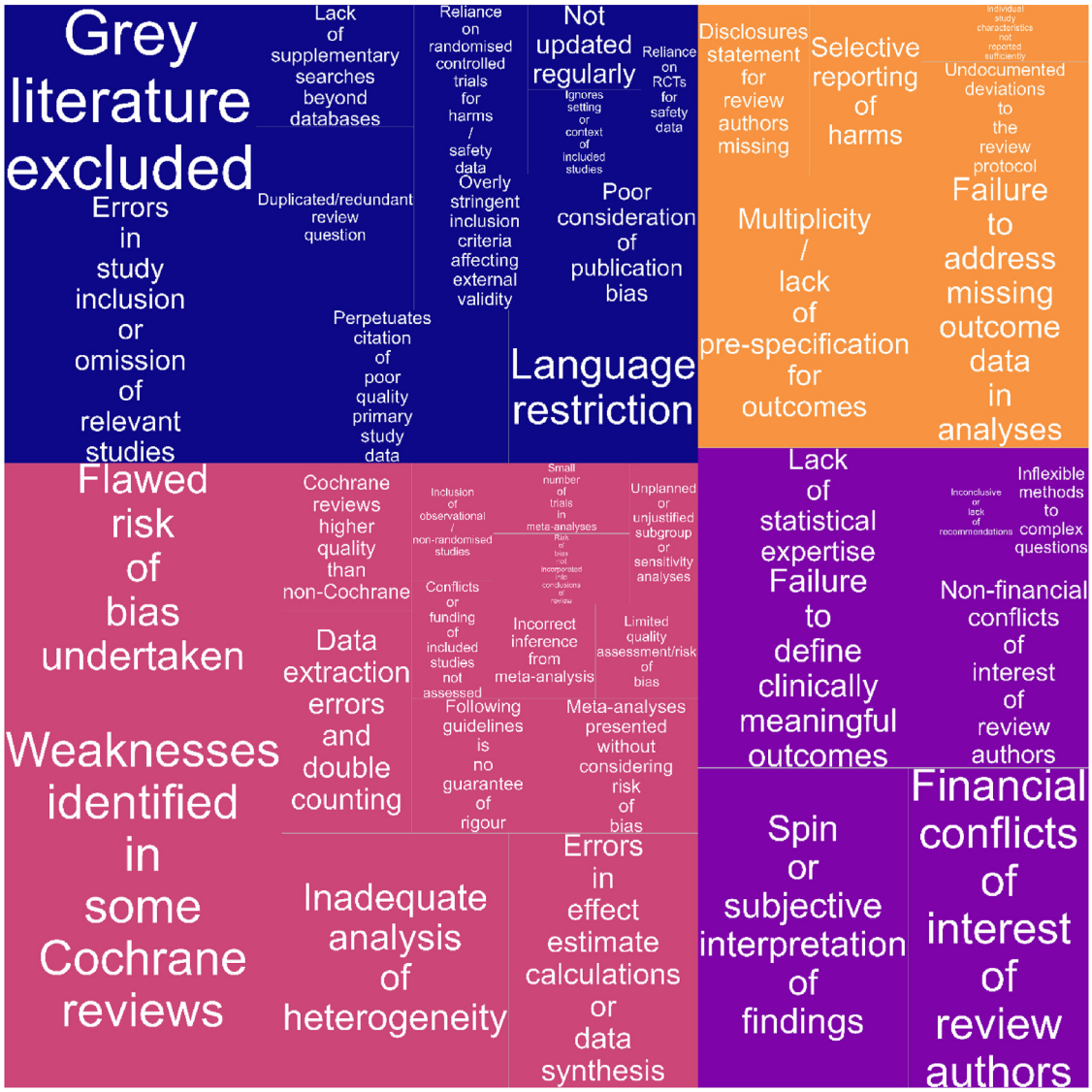

Figure 4. Treemap of problems found by 55 included articles to affect systematic review conclusions. Larger cells represent more frequently studied problems. Domains of systematic review conduct: Blue = Comprehensive; Orange = Transparent; Pink = Rigorous; Purple = Objective.

Table 2. Problems which have not been formally analyzed by the 637 included studies to assess their potential impact on systematic review conclusions

Domain	Problem
Comprehensive	Insufficient literature searches
	Errors or omissions in search strategy
	Outdated searches
	Untimely (taking too long) or resource intensive
Rigorous	Intervention not described/defined
	Inclusion of observational/nonrandomized studies
	No quality assessment undertaken or reported
	Incorrect interpretation or statistical inference error from metaanalysis
	Poor execution of narrative synthesis
	Low reporting or methodological quality (OTHER GUIDANCE)
	Lack of guidance or consistency in systematic overview/umbrella/review of systematic reviews
Transparent	Funding or sponsor of systematic review not reported
	Methods not described to enable replication
	Search strategy not provided
	Unwieldy/difficult to read
	Low reporting (PRISMA) quality
Objective	Review question not justified/important
	Lack of clinical expert/stakeholder/user perspective
	Failure to consider equity, different socioeconomic groups or disadvantaged populations
	Literature searches not validated by information specialist
	Interpreted without considering certainty or overall quality of the evidence base
	Guest/gift/ghost authorship

continually improve the conduct and quality of systematic reviews using existing research. A key benefit of a living approach is the ability to assess new trends in the context of previous research. Although systematic reviews are upheld as being objective and scientific processes, poor execution can render them misleading and even harmful, especially when they influence critical clinical decisions. The high number of articles scrutinizing systematic reviews in the 12 months following the initial review (up to May 2022) suggests that not only are systematic reviews often failing to live up to their trustworthy reputation, but also that metaresearch studies of systematic review problems which do not build upon previous research are increasingly common in academic literature.

4.1. The effect of research culture on the research being produced and published

Themes emerging from recent findings highlight issues rooted in research culture. Incentives underpinning the research environment, such as the pressure to publish academic journal papers, can impact the evidence ecosystem. Where regular publication in academic journals is valued for contract security and promotion, cheaper and faster routes to obtaining publications will be valued. Systematic reviews, being central to identifying, and synthesizing relevant research are at the pinnacle of the evidence-based hierarchy, and as such may be seen as certainty for publication which may lead to rushed or poorly executed studies [96].

A lack of gender diversity in systematic review author teams may speak to the gender representation, or other characteristics in the research workforce. This homogeneity can perpetuate biases, affecting outputs like systematic reviews. For example, 1 included study found that teams lacking diversity reported equity characteristics less thoroughly, underscoring the importance of varied perspectives for research that serves diverse populations [5].

Solutions to the existing problems have been suggested previously [1]. Effective research environments in any research endeavor require inclusive collaboration, transparent research reporting, rigorous methodological planning and objective participation from team members. However, traditional academic publishing rarely addresses the influence of research culture on these factors. While research integrity initiatives progress the conversation on open science platforms [97], researchers doing this work may not access traditional audiences and may miss out on the recognition in traditional academic spaces that rewards high-impact journal citations. Consequently, researchers committed to integrity risk hindering their own academic progress. Senior academics could help drive cultural change by modeling open science practices, as current metrics often emphasize journal publication volume over research quality.

4.2. Metaresearch and research waste: request for a new metaresearch agenda

Meta-analyses which may not have been conducted in the context of a systematic review (and would therefore be ineligible for study in this review) have proliferated [96] highlighting a research culture that values publication volume for career progression. Meta-analyses, metaresearch papers on systematic reviews and overviews of systematic reviews offer a relatively easy route to publication as they do not require ethics approval, comprehensive literature searches or adherence to methodological or

reporting guidelines, and so they can be performed with very little expertise or resources. Many such endeavors provide no protocol registration or evidence that they were conducted with a pre-established plan for analysis. The most abundantly studied problems by far involve inadequate adherence to reporting (PRISMA) and methodological (AMSTAR) guidelines. The observation that systematic reviews often do not closely adhere to systematic review guidelines has been made many times across many different specialties and academic journals. The number of ''me-too'' papers reiterating these observations without adding new insights continues to grow, yet few examine how low-quality reviews impact the validity of systematic reviews' conclusions and recommendations.

The rapid rise of overview/umbrella reviews (summaries of multiple systematic reviews) also raises concerns as many suffer from similar methodological weaknesses. There is a degree of irony that journals continue to publish these studies, while also continuing to accept substandard systematic reviews. To address these gaps the initiative www.systematicreviewlution.com aims to consolidate and advance discussions preventing research waste. A more productive metaresearch agenda would focus on evaluating whether and which well-established problems pose threats to the reliability of systematic review conclusions. We hope that by leveraging the insights and methodological designs from the metaepidemiological research cited in this article, along with the problems organized on www.systematicreviewlution.com, metaresearchers can advance the agenda of evaluating the consequences of substandard practices in systematic reviews, drawing on the extensive literature included in this living review.

5. Conclusion

The goal of this living review is to document issues raised across the academic literature to drive meaningful improvements. Newer findings suggest that research culture likely fuels flaws in systematic reviews and metaresearch studies. Systematic review authors, peer reviewers, and other users of systematic reviews are encouraged to use this living review to strive for best practice. Metaresearchers and other evaluators of systematic reviews can also benefit from this ongoing review by addressing known problems and refocusing efforts on assessing the impacts and solutions for both existing and emerging problems.

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work, the authors used Open AI ChatGPT to revise the manuscript narrative from passive to active voice. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

CRediT authorship contribution statement

Lesley Uttley: Writing − review & editing, Writing − original draft, Visualization, Supervision, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Conceptualization. **Yuliang Weng:** Writing − review & editing, Software, Data curation. **Louise Falzon:** Writing − review & editing, Validation, Project administration, Investigation, Formal analysis, Data curation.

Declaration of competing interest

This work is funded by the UKRI Medical Research Council with the intention of upholding best practice for systematic reviews but is conducted independently to any methodological or systematic review organisation. The authors posit that there are problems with many published systematic reviews which aligns with the funded research topic but have no other conflicts of interest to declare.

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Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jclinepi.2024.111608.

Data availability

Data supplied as appendices and also available at www.systematicreviewlution.com or the Open Science Framework page (https://osf.io/2hmv9/).

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