SYSTEMATIC REVIEW

A scoping review on what constitutes a good research culture

[version 1; peer review: 1 approved, 3 approved with reservations]

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Abstract

Background

The crisis in research culture is well documented, covering issues such as a tendency for quantity over quality, unhealthy competitive environments, and assessment based on publications, journal prestige and funding. In response, research institutions need to assess their own practices to promote and advocate for change in the current research ecosystem. The purpose of the scoping review was to explore '*What does the evidence say about the 'problem' with 'poor' research culture, what are the benefits of 'good' research culture, and what does 'good' look like?*'

Aims

To examine the peer-reviewed and grey literature to explore the interplay between research culture, open research, career paths, recognition and rewards, and equality, diversity, and inclusion, as part of a larger programme of activity for a research institution.

Methods

A scoping review was undertaken. Six databases were searched along with grey literature. Eligible literature had relevance to academic research institutions, addressed research culture, and were published between January 2017 to May 2022. Evidence was mapped and themed to specific categories. The search strategy, screening and analysis took place between April-May 2022.

Results

Open Peer Review

Approval Status ✓ ✓ ✓ ?

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1666 titles and abstracts, and 924 full text articles were assessed for eligibility. Of these, 253 articles met the eligibility criteria for inclusion. A purposive sampling of relevant websites was drawn from to complement the review, resulting in 102 records included in the review. Key areas for consideration were identified across the four themes of job security, wellbeing and equality of opportunity, teamwork and interdisciplinary, and research quality and accountability.

Conclusions

There are opportunities for research institutions to improve their own practice, however institutional solutions cannot act in isolation. Research institutions and research funders need to work together to build a more sustainable and inclusive research culture that is diverse in nature and supports individuals' well-being, career progression and performance.

Keywords
research culture, research institutions, funding organisations, academia, open research, early career researchers, transparency, research integrity

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Abbreviations

AI: Artificial Intelligence
CCB: Complementary Capacity Building
COPE: Committee of Publication Ethics
COS: Center for Open Science
COVID-19: Coronavirus Disease
CRediT: Contributor Roles Taxonomy
CV: Curriculum Vitae
DEI: Diversity Equity and Inclusion
DORA: Declaration on Research Assessment
ECR: Early Career Researchers
EDI: Equality Diversity and Inclusion
ENRI: European Network of Research Integrity
FAIR: Findable, Accessible, Interoperable and Reusable
FTC: Fixed Term Contract
HEI: Higher Education Institution
HEP: Higher Education Provider
INORMS SCOPE: International Network of Research Management Societies (INORMS)
ISRIA: International School on Research Impact Assessment
JBI: Joanna Briggs Institute
JSTOR: Journal Storage
KPI: Key performance Indicator
LMIC: Low Middle-Income Countries
MyNRMN: National Research Mentoring Network
NA: Not applicable
NHS: National Health Service
NIC: Networked Improvement Community
NRMN: National Research Mentoring Network
OA: Open Access
OKI: Open Knowledge Institutions
OIS: Open Innovation Science
ORBIT: ORCID's Reducing Burden and Improving Transparency
ORCID: Open Researcher and Contributor IDentifier
OSF: Open Science Framework
PEER: Persons Excluded from science because of Ethnicity and Race
PhD: Doctor of Philosophy
PRISMA-ScR: Preferred Reporting Items for Systematic Reviews and Meta-analyses extension for Scoping Reviews
QPP: Quality Publication Practice
REF: Research Excellence Framework
RFO: Research Funding Organisations
RoRi: Research on Research Institute
RPO: Research Performing Organisations
RRP: Responsible Research Practice
STEM: Science, Technology, Engineering, Mathematics
STEMM: Science, Technology, Engineering, Mathematics and Medicine
TOP: Transparency and Openness Promotion
UK: United Kingdom
UKRI: UK Research and Innovation
UKRN: UK Reproducibility Network
USA: United States of America
WoS: Web of Science

Background

Concerns about the pressures of working in research and the potential negative impact of a poor research culture are well documented in academic literature across diverse disciplines.[1,2] There is a strong connection between concerns about research culture and the inappropriate use of metrics and indicators that drive both institutional and individual researcher behavior, assessment and reward.[3–5] In response to these concerns, a number of actions have emerged to enable and encourage the adoption of a healthier research culture.[6–8] International action to address the underlying drivers of poor research culture include INORMS SCOPE framework for responsible research evaluation[9]; Declaration on Research

Assessment (DORA)[10]; development of 10 principles for the measurement of research performance: the Leiden Manifesto for Research Metrics[11]; establishment of the International School on Research Impact Assessment (ISRIA)[12]; and the HuMetricsHSS Initiative.[13]

In response to concerns about the experience of working in research, the Wellcome Trust undertook work in the UK to better understand research culture, which has enabled initiatives from the Russell Group and the Royal Society to actively work towards enabling researchers to 'flourish'.[14] A survey conducted by the Wellcome Trust, focused on the experience of researchers, revealed that poor research culture is leading to unhealthy competition, bullying and harassment, mental health issues, and a system that favours quantity over quality.[15] Unfortunately, these experiences mirror previous findings, and show the longevity of the issues as the research environment continues to be pressured, competitive and uncertain for many researchers.[16]

The consequences of poor research culture does not only impact researchers, it also effects research support staff (e.g., technicians, research managers and administrative staff), the production and quality of research, reduces innovation in research and affects public trust in research.[17–21] Funding organisations such as UK Research and Innovation (UKRI) enhanced its 2021-2022 allocation of research culture funding to Higher Education Providers (HEPs) to further explore research processes and experiences of working in research, through piloting new initiatives or enhancing existing activities.[22]

Striving for excellence and changing research culture is a collective responsibility, requiring action from research institutions, funding organisations and researchers.[14] Higher Education Institutions (HEIs) need to assess their own practices to promote and advocate for change in the current research ecosystem. As highlighted by the Wellcome Trust and others, there remains a tendency for quantity over quality, assessment based on publications, journal prestige and funding.[5,15,23,24] Any attempts on reform requires commitment from everyone (e.g., publishers, research institutions, funders, researchers etc.) so that diversity, impact, teamwork, open research, and assessment systems are valued. In turn, we may begin to see enhancements for the promotion of transparency, open access, knowledge mobilisation and collaborative networking practices.

The consequences and challenges associated to an inadequate research culture is well evidenced across the research ecosystem and several reports, from funding organisations to independent providers, demonstrating the extent of the problem (for whom and in what context) and the need for a cultural change in research.[14,15,25,26] However, the evidence very much focuses on the challenges and barriers, with limited evidence on solutions or how to implement change, initiate opportunities, or what works for whom and in what context that is fit for purpose for all individuals (inclusive of all research and non-research staff in an academic environment).[27–29]

The purpose of this scoping review was to explore the evidence on what constitutes a good research culture and how open research, career research paths (recognition and awards) and equality, diversity, and inclusion interplay to enhance and promote a more sustainable research culture environment. The scoping review was intended to inform future practice within a specific research organisation (the University of Southampton, UK), recognising the broader interest in and application of the findings. The scoping review was conducted to address the following question: *What does the evidence say about the 'problem' (barriers, challenges, consequences etc.) with 'poor' research culture, and what are the benefits of 'good' research culture, and what does it look like?*

Methods

Scoping reviews are relevant to addressing research questions that seek to identify priorities for research, clarification on concepts and definitions, identifying research frameworks, or locating background information in preparation for a systematic review. Scoping reviews aim to understand *'What has been done previously?'* and *'What does the literature say?'* compared to systematic reviews that ask the question *'Does this intervention work for this group of individuals?'* The purpose of this scoping review was to identify the current evidence and body of relevant literature using the Joanna Briggs Institute (JBI) guidance/approach to guide the development, analysis and write up of the scoping review.[30–32] Using this approach enabled the reviewers to map the evidence to four key areas highlighted from existing published work from the Wellcome Trust, to ensure consistency and continuity to predefined areas already established by the research environment.[15]

Eligibility criteria

Context: The context included UK and international settings within the academic environment (research ecosystem).

Participants: Academic, administrative, and technical staff and students of all levels, grades, disciplines, and professions. To be inclusive of academic and non-academic staff to ensure an inclusive approach and incorporating the principles of 'team science' and organisational culture.

Inclusion criteria: Evidence from research institutions only (considering Education, Enterprise and Research, the triple helix approach[33,34]) for both academic and grey literature were included. All disciplines within the academic environment were included.

Exclusion criteria: Anyone undertaking or supporting research outside of a research institution/Higher Education Institutes environment (for example in the health and social care field the National Health Service (NHS) Trusts, hospital settings, primary health care settings, allied health professional settings). Industry and non-academic businesses (including consultancies) were not included as they were not considered to have an academic focus. Non-English articles were excluded if no translation was available for the full article.

The database searches and grey literature did not have any limitations on country of origin, apart from news items that were restricted to the UK, Europe, North America, and Australasia.

Types of sources

The scoping review considered all types of study designs for inclusion (e.g., randomised controlled trials, non-randomised controlled trials, before and after studies and interrupted time-series studies, analytical observational studies including prospective and retrospective cohort studies, case-control studies, analytical cross-sectional studies, descriptive observational study designs including case series, individual case reports and descriptive cross-sectional studies).

Qualitative studies were also considered that focused on qualitative data including, but not limited to, designs such as phenomenology, grounded theory, ethnography, qualitative description, action research and feminist research. In addition, systematic reviews that met the inclusion criteria were considered, depending on the research question. Editorials and opinion papers were also considered for inclusion in the scoping review.

A range of data were required to be as inclusive as possible due to the diverse nature of how research culture is reported and discussed in the public domain (and its associated parts in Open Access (OA), Equality, Diversity, and Inclusion (EDI) and career paths). Therefore, the review included published material from academic outputs (e.g., Journal articles, commentaries, editorials, perspectives, opinion letters) and from grey literature (e.g., reports, blogs, web-based articles, and newsletters including associated webpages of relevance).

Search strategy

The search strategy aimed to locate both published and unpublished citations. An initial limited search of Medline and Web of Science (WoS) was undertaken to identify articles on the topic, to develop and pilot the search strategy. The text words contained in the titles and abstracts of relevant articles and reports, and the index terms used to describe the articles were used to develop a full search strategy.[15,35–38] The search strategy, including all identified keywords and index terms, were adapted for each included database and/or information source.

There were no study or language limits applied in the information retrieval process. The search strategy was limited from 2017 to 2022 but a preliminary search of citations during 2015-2022 was initially screened for relevance. Preliminary scoping and piloting of the search terms and strategies suggested that five years was sufficient for literature to be relevant, current, and broad (including relevant citations on the reporting of initiatives such as DORA, and any changes due to the COVID-19 pandemic). The review included UK and international literature (including grey literature, although see below for pragmatic restrictions for news items).

*Databases***:** Six databases were searched (Medline, Engineering village, Scopus, JSTOR, ProQuest and WoS) during the period 29 April to 18 May 2022. A range of databases enabled the reviewers to capture several disciplines and to be as inclusive as possible.

Grey literature searches: A pragmatic systematic search was undertaken of the Lexis-Nexis Academic database concentrating on newspapers and news items. The scoping and piloting of the search terms in the database suggested that geographical exclusions were needed due to the scale of results from the searches. As part of discussions with team members as well as an experienced librarian, the results were filtered to only include news outlets and organisations based in UK, Europe, North America, and Australasia. To augment the news searches, purposive sampling of relevant research websites was documented in an Excel spreadsheet to record all platforms and webpages visited. The sampling of websites

was drawn from discussions with team members as well as an experienced librarian. Examples of research websites explored include: The Conversation, Nature, Science, UK Research and Innovation (UKRI) and Research on Research Institute (RoRi). Relevant citations were identified from Wellcome Trust[14,15] as well as snowballing. The key references of the included articles and/or reports were screened for additional citations to be included as part of the overall screening process (including grey literature).

Data extraction and evidence selection

Following the searches, all identified articles were collated and uploaded into Endnote version 20 (*Clarivate Analytics, PA, USA, https://endnote.com/*) (a free alternative is Mendeley: https://www.mendeley.com/) and duplicates were removed. Following a pilot test, all titles and abstracts were screened, by two independent reviewers for assessment against the inclusion criteria for the review using Rayyan. Potentially relevant articles were then retrieved for full extraction. At the full citation screening stage, reasons for exclusion were noted independently by both reviewers. Where the independent reviewer was unsure, the article was discussed, and a decision was made by consensus. Screening at both stages (title and abstract and full extraction) was piloted using Rayyan and labels were applied to categorise the focus of the articles based on four areas:

- Security (including career paths, career progression, stability contracts/careers, issues affecting early career researchers etc.)

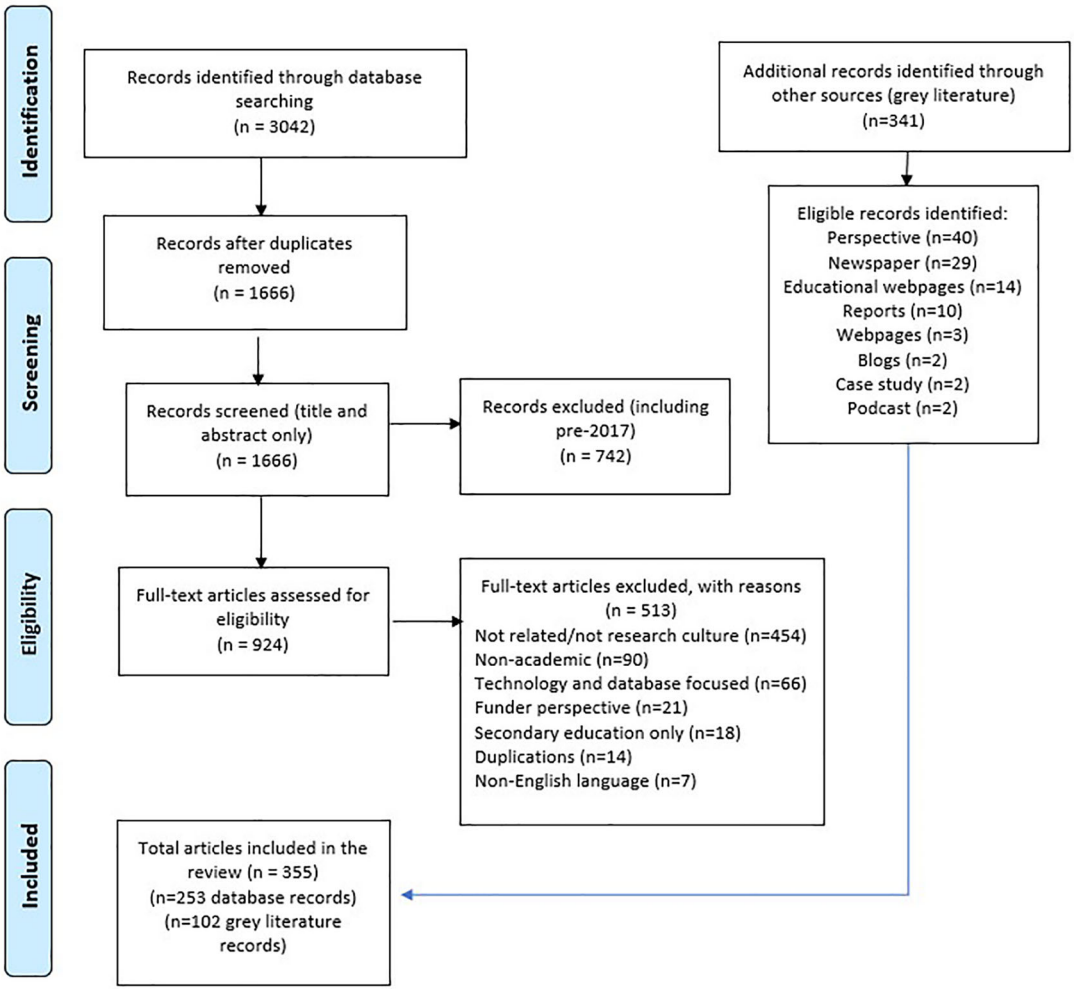

Figure 1. PRISMA flow diagram.

- Wellbeing and equality of opportunity (including equality, diversity and inclusion, mental health, and well-being, bullying and harassment)

- Teamwork (including team science, recognition of broad contribution to research, incentives)

- Research quality and accountability (including research integrity, reproducibility, policy, and governance).

These focus areas were reported in the Wellcome Trust report and formed the basis of the current scoping review, to enable the University of Southampton to build on activity already undertaken, activity underway and enable alignment for future consideration.[14,15]

The list of included articles for full extraction were then exported to a Microsoft Excel spreadsheet using the labelling of articles from Rayyan (these categories were grouped together under the four focused areas). The results of the search and the study inclusion process are reported in full using the Preferred Reporting Items for Systematic Reviews and Meta-analyses extension for scoping reviews (PRISMA-ScR), including the flow diagram reported in Figure 1.

Both reviewers extracted data from the full text articles using a data extraction tool developed by the reviewers to address the research question. This included the focus of the article, issues and/or problems reported in the article, solutions and/or recommendations provided in the article and details about whether the article related to more than one topic area.

No risk of bias or assessment on quality was conducted due to using a scoping review methodological approach. All the evidence was mapped and categorised into the four areas, which were discussed and agreed between team members at various stages of data extraction and during the write-up of the findings.

Results

A total of 3,042 articles were retrieved from the six databases. With 1,376 duplications that were removed, 1666 titles and abstracts and 924 full text articles were assessed for eligibility. Of these 924 full text articles, 253 articles met the eligibility criteria for inclusion.

A total of 341 documents were retrieved (Lexis-Nexis) or identified across all the sources based on the titles. These were assessed for eligibility of which 102 met the criteria for inclusion.

Figure 1 provides a full account of the records of identification flow diagram, including the reasons for the excluded articles.

Characteristics of the included studies

From the evidence there was a steady rise in the number of published articles over the last five years, with a notable increase from 2019. Table 1 shows that from the 253 included articles, there were 135 original research articles (this included qualitative and quantitative studies), 20 review articles (using a range of methodological review approaches), 86 perspective articles and 10 conference proceedings.

The location of the study generation was captured for the included articles (based on location of the research and/or authors location). The included articles covered a global perspective with 71 articles from USA and Canada, 73 from international locations such as Africa (n=13), China (n=7), Australia (n=7) and Pakistan (n=4), 36 from Europe and 17 from the UK.

The grey literature provided 102 additional materials, 40 perspective articles reported in journals, 29 newspaper articles, 17 webpages (including educational webpages such as The Conversation: https://theconversation.com/uk) and including 10 reports. The remaining six were either a podcast, blog or case study. A majority of the grey literature material could not be grouped by location due to the nature of the material (76.5%, 78/102).

Summarising the evidence

The evidence found in the database searches and grey literature was grouped according to the four focused areas, based on the key concepts developed during the full screening of the articles (based on the Wellcome Trust report).[15] Several included articles were relevant to more than one focus area, which showed the breadth of the topic but also how these areas are overlapping and mutually reinforcing. For example, evidence reported under security was also closely linked to wellbeing and equality of opportunity (especially for early career researchers (ECRs) and Science, Technology, Engineering, Mathematics and Medicine (STEMM)).

Table 1. Characteristics of the included studies.

Characteristics	N=253 (%) Databases	N=102 (%) Grey literature
*Areas of focus:**		
Security	72	69
Wellbeing and equality of opportunity	52	50
Teamwork	64	40
Research quality and accountability	133	52
Year of publication:		
2017	20 (7.9)	12 (11.7)
2018	18 (7.1)	30 (29.4)
2019	47 (18.6)	15 (14.7)
2020	61 (24.1)	11 (10.8)
2021	85 (33.6)	27 (26.5)
2022**	22 (8.7)	7 (6.9)
Country:		
UK	17 (6.7)	7 (6.9)
Europe	36 (14.2)	2 (1.9)
USA and Canada	71 (28.2)	4 (3.9)
International	73 (28.7)	11 (10.8)
NA	56 (22.2)	78 (76.5)
Article type:		
Journal – Original research (including panel discussions)	135 (53.5)	0
Journal – Review	20 (7.9)	0
Journal – Perspective***	86 (33.9)	40 (39.3)
Conference proceeding	10 (3.9)	0
Book	2 (0.8)	0
Blog	0	2 (1.9)
Case study	0	2 (1.9)
Newspaper	0	29 (28.5)
Podcast	0	2 (1.9)
Report	0	10 (9.8)
Webpages/Educational webpages	0	17 (16.7)

*Note that some articles reported under more than one area of focus. The total number does not equal to the number of articles included in the scoping review.
**Jan-April inclusive, searches were conducted during April-May 2022.
***Includes, editorial, commentaries, news features, correspondence, and perspective articles in journals.

The sections below provide a summary of the evidence based on the four focused areas, with particular attention on security, wellbeing, equality of opportunity and teamwork, and research quality and accountability.[14,15] (see Figure 2) The quality or assessment of these initiatives were not explored as part of this scoping review and the key considerations arising from the evidence are not presented in order of priority.

Security and career progression

From the evidence it was clear that there is a global drive to expose the challenges and barriers in academic research culture. It was evident that these factors were not exclusive to specific countries, disciplines, or research institutions and the challenge is at a system level. Concerns over job security, career progression and sustainability were particularly experienced by PhD students, ECRs and junior researchers from a range of academic environments.[39–42] The evidence reflects the range of research careers, roles, skills and expertise that are involved in research activity. Research Institutions

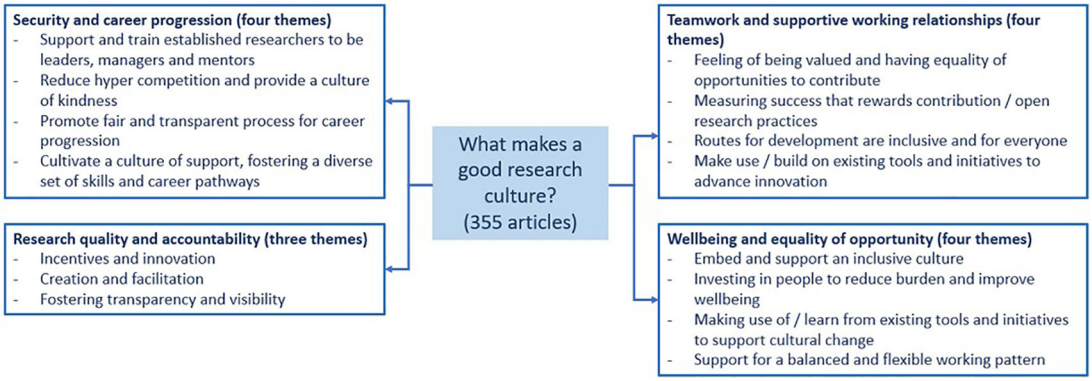

Figure 2. Summary of the evidence base on the four focused areas.

often separate staff into job families such as research, education, technical, clinical, and managerial and professional roles titles reflecting different career pathways.[17,43–45]

The evidence suggests there are concerns that research institutions are not managing career progression expectations or providing ways to develop and train staff, which can result in inequality between career types.[17,43–45] This can accumulate in feelings of failure by staff, or staff feeling pressured to be successful, which ultimately could promote unhealthy working practices such as excessive workloads and working long hours to meet expectations.[46–48] These issues affect all research institution staff but the evidence suggests they are particularly acute for several groups such as ECRs, STEMM, people on Fixed Term Contracts (FTC), people with caring responsibilities, and people with disabilities[46–48] (see Table 2 for a summary of the key considerations associated to security and career progression).

The review suggests that the problem is reinforced by a culture where researchers are incentivized to produce many funding applications and academic publications where high rejection rates.[47] A related issue identified was the risk of evaluating academic performance based on the use of inadequate proxies (e.g., publication productivity, impact factor and citations).[3,49] Evidence suggests that this can result in a lack of workload oversight, a culture discouraging of appreciation, that in turn makes researchers feel pressured to be successful, often resulting in a significant amount of time in pursuit of success at the cost of their wellbeing.[42,46,47,49–51]

The concept of research culture and job security was broad and included (but is not limited to) career paths; stability of contracts and careers; and issues affecting ECRs and students.[57,141,145] A wide range of initiatives were explored in the literature covering a broad spectrum of factors (as detailed in Table 2). The evidence showed how, where, and why changes are needed to establish a global cultural change to the research ecosystem to enable fair and transparent progression for all research staff[99,104,161]; cultivate a culture that fosters diversity across career pathways[17,55] and; initiate deeper integration of knowledge to ensure institutional stability.[57,153]

The evidence suggests that offering potential solutions or supportive actions for academic institutions and the research community may enhance and stabilise career paths, particularly those in the early career stage, including those in technical and managerial roles. Although these solutions and supportive actions are by no way exhaustive, they do provide a summary of the range of factors that could go some way in promoting a better research culture.[54,138,154,162]

Wellbeing and equality of opportunity

A key consideration from the evidence suggests that there are disparities across the research ecosystem, which are in turn influencing individuals' wellbeing.[39,40,43,70,92,96,99,118,163–166] The impact of these disparities are preventing or slowing down initiatives to seek for a cultural change in the academic environment. Although there has been some progress, the evidence suggests progress is slow and continues to be a challenge, especially for under-represented groups.[166–169] The disparities highlighted in the literature suggests that under-represented groups are less likely to be promoted or receive funding, and have a higher risk of decreased well-being.[18,64,83,89,170–179] However, as Lee (2022) pointed out, although underrepresented groups and junior staff are more likely to experience these challenges, including microaggression (and being victimised regardless of their role or position), anyone can, at some point in their academic career experience some form of microaggression (e.g., bullying, patronage power, exploitation, discrimination).[20] This also extends to the notion of imposter syndrome as noted by Hagan (2020).[169] Moreover, the way disciplines are taught at university means that curricula focusing on traditional perspectives may not be inclusive to everyone.[123,176]

Table 2. Key concepts and statements associated to security and career progression.

Key themes	No	Statements	No. refs
Support and train established researchers to be leaders, managers, and mentors	1	Consider evaluating supervisors and mentor support by including impact statements of projects and career progression, including encouraging multiple career paths, benefits of collaboration across disciplinary boundaries and pooling scarce resources[8,14,24,44–47,51–83]	40
	2	Provide all staff with access to flexible approaches and methods to mentoring and peer coaching schemes, enabling self-learning, innovation and productivity[6,17,46,47,52,53,55,56,58,61,62,64,66–69,71–73,75,76,78,81,82,84–98]	35
	3	Consider feedback initiatives to support continued professional development for supervisors and team leaders or collate benchmarking data focused on the culture of the research team between supervisor-student[23,24,42,43,48,54,57,59,60,62,64,66,70,80,92,98–111]	30
	4	Explore opportunities for leadership and management training (including project management) for all staff, levels, stages, and position within academia)[24,43,54,57,60,62,64,66,67,70,90,95,96,100,103,104,107,112–121]	27
	5	Provide those who supervise PhDs, counsel researchers (including ECRs/junior staff) with clear guidelines on best practice and mechanisms for support (including benefits of networking), encouraging an open mind about career progression[26,45,51,52,57,59–62,66,69,74,79,81,83,85,104,114,122–129]	26
	6	Seek ways to reduce the administrative burden for those involved in leading and managing research, including innovative tools to support meaningful networking connections (e.g., MyNRMN, National Research Mentoring Network, Kaupapa Māori Frameworks)[8,24,46,53,55,61,62,66,67,71,73,78,81,82,85,90,92,107,126,129]	21
	7	Explore ways to support staff with line management skills including appraisal and inclusive management practices and motivate managers to prioritise these duties, including upskilling of staff[43,54,69,118,125,130]	6
Reduce hyper competition and provide a culture of kindness	1	Recognise and incentivize all staff for developing equitable practices and partnerships (e.g., capacity building with Low Middle Income Countries (LMICs) as collaborators and beneficiaries) and focus less on publication numbers and citations (including grant awards)[4,17,37,41,57,68,70,80,94,102–106,108,109,116,117,130–139]	28
	2	Provide regular opportunities for informal, open, safe and honest conversations (and how to optimise the role of networking), including environmental tensions between research, education, teaching etc.[42,47,48,52,57,61,63,67,69,81,95,104,113,122,125,132,136,137,140–144]	24
	3	Consider ways to demonstrate support for other researchers to secure funding as part of progression (and review current reward systems), ensuring education, teaching and research are equally prioritised[37,48,55,60,61,88,94,96,114,124,132,137,140–143,145]	17
	4	Encourage staff to provide positive feedback and praise to each other, making the working environment friendly, productive and conducive for learning[6,48,62,63,84,86–88,91,95,97,98,139,141,145–147]	17
	5	Raise awareness on the value of sharing science outreach goals, promoting mutual learning for all (including academic induction and orientation practices) to help with retention and progression[17,40,54,55,59,63,66,68,95,115,122,137,138,143,144,148,149]	17
	6	Provide opportunities for shared learning and to develop from failure in funding applications and publishing, avoiding the stresses of perceived failure[47,59,68,114,122,130,150]	7

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Table 2. *Continued*

Key themes	No	Statements	No. refs
Promote fair and transparent process for career progression	1	Ensure greater alignment between individual and institutional values that encourages teamwork (team science), collective leadership and shared decision-making, building a more supportive academic culture, and facilitating institutional and departmental recognition in faculty career development[17,23,24,26,37,41,43–45,47,48,51,54,55,57,60,62,63,65–69,72,74,79,83,87,89,91,93,98–107,109,110,112,114,117,123,125,130,133,134,137,138,140,141,143,149,151–154]	61
	2	Consider approaches to award and recognition of performance that is not solely based on academic publications that is fair and transparent for all staff, differentiating key performance areas, as well as the workload of academics in various career stages and positions[4,17,23,45,47,52,54,55,57,63,68,79,101,103,114,116,123,125,132,135–137,139,142,144,145,151,152,154]	29
	3	Raise awareness about using research metrics responsibly and appropriately. For example, do not use journal-based metrics, such as Journal Impact Factors, as a surrogate measure of the quality of individual research articles, to assess an individual scientist's contributions, or in hiring and promotion (flaws in the current awards system not promoting research)[3,4,20,26,37,50,56,61,68,84,124,126,139,155,156]	15
	4	Consider and optimise how academic CVs are used. Provide instructions for researchers and evaluators; prioritise actual achievements; focus on recent achievements, relevant activities and outputs; acknowledge the broad range of contributions; balance and control incentives; use academic age not biological age; encourage narratives; and use metrics cautiously (Open Researcher and Contributor ID organization (ORCID) as a spin-off from ORCID's Reducing Burden and Improving Transparency (ORBIT) project to foster exchange and pool expertise, to optimise the responsible use of contributions and metrics)[3,4,20,26,50,55,56,84,114,126,155,156]	12
Cultivate a culture of support that fosters a diverse set of skills and career pathways	1	Raise awareness of the issues surrounding research culture amongst ECRs so they can contribute to the University, their departments or research teams by: facilitating membership of formal networks, provide opportunities to connect with colleagues for social and work-related activities, and review policies around office attendance that support integration and innovation[6,23,26,40,41,46,48,54–57,61,63,69,87–89,93,98,99,101,104–106,109,119,126–128,137,149,150,154]	34
	2	Consider ways to embed 'career optimism' to teach, prepare and respect the diversity of career pathways of PhD students/early career researchers within and beyond the University (and finding your research niche)[17,23,42,44–46,51,52,54,55,59,63,83,96,101,102,111,115,119,123,127,128,142–144,151,153,154,157]	29
	3	Provide opportunities to encourage ECRs to join and engage in conversations that affect them, such as research assessment, career progression, awards system (including sabbatical leave)[3,6,26,44,54,55,60,61,63,74,83,88,96,101,104,105,115,117,119,124,126–128,145,149,151,155–157]	29
	4	Recognise and value the diverse skill-set of research managerial and technical staff and provide opportunities for them to host and supervise researchers, apply for research grants and undertake research promoting the benefits of collaboration rather than competitive research culture[4,8,17,37,41,44,45,59,63,68,80,91,94,95,104,106,109,110,118,142,147,149,153,154,157,158]	27
	5	Offer opportunities to build hybrid careers by offering different and multiple pathways and opportunities in research, including alignment with the private sector and employment outside of academia for when long-term academic employment is not viable[6,45,52,55,65,74,79,83,102,113,115,117,122,124,142,149,151,153,154]	19
	6	Consider how to develop a career development mindset that supports people in all aspects of research not just research projects, therefore attracting a diverse workforce and provide greater career stability (e.g., type of contract)[44,45,52–55,63,73,83,100,101,103,125,145,151,154,157,159]	18
	7	Offer or provide opportunities for writing retreats, boot camps, away days and mentoring including cross disciplinary training, enabling informed decisions such as choosing your own mentor[17,46,52,53,58,64,69,71–73,75,76,82,89,96,117,160]	17
	8	Consider how those in research management and technical roles (including librarians) have adequate routes to continued professional development through inhouse or formal training (examples from University of California Curation Center, part of the CDL, and the Digital Curation Centre in Edinburgh, UK)[40,43,70,95,96,108,113,117,119-121,142,147,149,153,158]	16
	9	Explore ways to implement a 'culture of structure' for graduate students where expectations are clear and students have contact with multiple faculty members, including focus on sources that support all students, faculty, and staff[23,40,42,45,55,59,91,92,102,110,111,122,144,152,154]	15

Table 3. Key concepts and statements associated to wellbeing and equality of opportunity.

Key themes	No	Statements	No. refs
Embed and support an inclusive culture	1	Create a climate for diversity and inclusivity by working collectively to reduce attitudes of hostility and competition that are pervasive, including among STEM fields (e.g., SciComm, diversity programs), including combating the barriers to inviting diverse speakers and self-nomination[6,44,69,73,78,79,81–83,89,106,109,111,120,123,129,146,147,156,170,171,173,175,176,183–202]	43
	2	Lead with data by moving from expert opinion and commentary on effective measures for advancing Diversity Equity and Inclusion (DEI) to objective, validated, and evidence-based research and evaluation[6,18,73,78,79,81–83,88,89,98,106,109,111,120,129,156,166,167,170,173,175–177,189–191,193–195,198–207]	41
	3	Enable honest conversations around the complexities, challenges and barriers to achieving diversity in leadership[6,73,78,79,81–83,89,92,98,106,109,111,120,123,129,156,165,167,175,176,184–186,188,193,195,197–205]	36
	4	Diversify visible reporting routes to encourage institutions to move away from performative actions and acknowledge that institutional factors play a role in improving mental health for individuals (e.g., 'Me Too' movement, #STEMToo social media hashtag to share stories)[6,18,20,42,46,51,69,74,75,79,80,89,91,97,101,107,111,146,147,171,179,189–191,197,202,208,209]	28
	5	Encourage and support staff and students to build support groups, to reach out for help, to talk openly about mental health, and to ask how others are doing[6,20,42,46,51,74,75,79,80,89,91,96,97,101,107,111,120,123,173,198,202,209]	22
	6	Use institution-specific data to drive changes in policy and programming to improve the social culture and climate, including shift institutional practice in a context-specific way[61,89,98,101,109,162,167,169,170,177,179,184,186,197,210,211]	16
	7	Create greater emphasis on cultural competency, to enable the ability to understand, honor, appreciate, and respect the values, beliefs, attitudes, and behaviors of those from cultures different to our own[89,98,101,109,167,169,170,173,183,195,212]	11
	8	Enable conversations that shine a light on power imbalances within academia through initiatives (e.g., "Me Too" Movement)[18,122,165,167,169,170,177,195,197,204,211]	11
	9	Explore avenues which will help to identify how disciplines could be taught through a more inclusive and ethical lens, ensuring that socio-economic data on employees is collected and monitored (as recommended by the Social Mobility Commission)[123,189–192,194,195]	7
	10	Improve professional workplace mental health and access to services/support for mental health and ensure that use of such services does not stigmatize. In addition, invest to improve mental health literacy across the institution, supporting those who provide assistance and training in mental health, particularly post COVID[18,46,51,96]	4
Investing in people to reduce burden and improve wellbeing	1	Train leaders, principal investigators, staff and students in mental health and diversity, and dignity and respect[6,20,42,46,51,74,75,78–82,89,91,97,101,107,109,120,123,129,156,164,175,176,184,185,187,190–193,198–202,205,209]	42
	2	Enable access to childcare near or on campus, extend paid maternity/parental leaves, parttime options for work, a career pause during children's formative childrearing years, greater access to administrative and research support, and the fundamental recognition of family status in academic policies and practices[6,20,42,46,51,73–75,79,80,83,89,91,96,97,101,107,111,122,146,147,165,167,177,179,196,203,209,213]	29
	3	Provide or maximise mentorship, sponsorship and collaboration between academics at all stages of their career[44,46,47,61,64,69,73,89,98,101,109,162–165,172,184,193,196,197,199,202,212,214]	27
	4	Consider courses aimed at underrepresented groups to improve confidence, assertiveness and to manage negative influences, such as imposter syndrome; empower staff through participation in decision-making/problem solving[118,162,173,179,187,197,199,210–212,214]	11
	5	Consider pre-assessing research skills so that different types of mentor-mentee matching strategies can be formed in as many areas as needed, which can help new investigators, early-stage investigators and underrepresented minorities[47,61,64,69,163,184,193,203,212]	9
	6	Reward or emphasize collaboration over competition[44,80,89,98,101,109,215]	7

Table 3. *Continued*

Key themes	No	Statements	No. refs
Making use of and learning from existing tools and initiatives to support cultural change	1	Consider adopting an inclusive and shared leadership model such as Networked Improvement Community (NIC) which focuses on shared leadership, inclusive practices in different contexts (e.g., for STEM, establishing a culture of equity and engagement) to strengthen infrastructure at local levels[69,78,89,96,98,101,105,146,147,164,165,169,171,173,177,179,183,184,189,194,197,204–206,215,216]	26
	2	Encourage/signpost staff to peer groups to enable and encourage networking and shared understanding including critically reflect on cultural identity(e.g., Blackett Lab Family, Black Heroes of Mathematics, Africans in STEM)[69,122,146,164,166,170,171,175,207,214,217]	11
	3	Implement and encourage staff development opportunities (e.g., StellarHE) that are inclusive to and for everyone, regardless of characteristics, career stage or job role, including Learn from networks and initiatives such as the National Research Mentoring Network (NRMN), Athena Swan (UK based), sign up to UK's Concordat to Support the Career Development of Researchers[53,69,123,162,163,179,189,194,197,203]	10
	4	Consider adopting PRESS, an evidence-based framework for achieving racial equity; as well as using well-designed metrics that can help to manage discrimination 'blind spots' and encourage a 'sense of belonging' (e.g., Challenged Sense of Belonging Scale)[166,169,173,180,204–206,217]	8
	5	Seek to safeguard the physical and emotional well-being of PEER trainees, by equipping STEM allies with tools to combat discrimination (e.g., Allyship for PEER trainees (Persons Excluded from science because of Ethnicity and Race (PEERs))[69,122,146,166,169,171,180,214]	8
	6	Increase uptake of digital tools and inclusion-sensitive pedagogy to support equal participation in Higher Education programmes, including promotional materials and promote open knowledge institutions (OKIs) in diversity, communications and coordination, support opportunities for virtual conferences to increase access for researcher participation in training, symposia, and conferences[162,168,180,185,187,194,208]	7
	7	Consider the use of Authentic Interrogation, Acknowledgment, and Accountability that requires SciCommers to explicitly articulate the ways in which STEM and SciComm have been used as systems of oppression[69,146,169,171,183]	5
Support for a balanced and flexible working pattern	1	Ensure staff contracts can accommodate better pathways for flexible working so there are no unintended consequences on career for focusing on care-giver responsibilities or changing circumstances[69,78,92,96,118,122,146,147,162,165,167,169,177,179,196,203,213]	17
	2	Put in place options that help staff to return to work after a period of absence to improve transition back to work and promote life-work balance (for students and staff)[18,69,96,118,120,123,146,162,165,167,177,196,198,203]	14
	3	Commit to the ring-fencing of research-time and ensure researchers confirm time against other duties (i.e., teaching, administration, marking and preparation), including leaders model healthy working practices[46,48,78,122,146,162,212]	7
	4	Include working hours as a standing item on appraisals and manage expectations around working hours, breaks and holidays to reduce excessive working hours, including use more inclusive job descriptions in hiring processes[46,48,96,122,156]	5

Table 4. Key concepts and statements associated to Teamwork and supportive working relationships.

Key themes	No	Statements	No. refs
Everyone feeling valued and having equality of opportunities to contribute	1	Encourage faculties to support collaborations and networks that provide a sense of mutual support and culture of team effort rather than individual competition, through interactive learning environments and faculty members as supporters and mentors[5,19,23,26,41,43,45,46,49,59,60,69,72,73,87–89,92,95,98,99,101,107,109,130,141,164,172,177,178,181,193,206,212,220–236]	51
	2	Consider incentives and mechanisms to share open data and empower multi-disciplinary teams to reuse data, and adopt incentives that are transparent across funding agencies, journals and institutions (including replication research)[23,26,41,43,48,49,87,89,98,99,101,109,141,154,215,218,220,232,233,235–240]	24
	3	Encourage transformative interdisciplinary research to diversify teams, deepen integration of knowledge and move beyond separate disciplinary research[19,23,26,41,46,49,57,69,73,87–89,101,109,164,206,220,222,224,235,236,241,242]	23
	4	Bring researchers together under a common goal to address specific research issues through a challenge-led (problem-led) research approach (including the health of labs)[19,45,46,57,69,73,88,89,92,98,101,158,178,224,229,239,241]	17
	5	Provide greater opportunities and capacity for technical and library staff to improve their own research skills through networking, collaborative partnerships and being contributors to research, including raising accessibility for multi-disciplinary teams and interaction[45,90,95,107,130,158,215,224,234,243–245]	12
	6	Ensure that those in research management and technical roles have adequate routes to continued professional development through inhouse or formal training (including ethical considerations and issues)[95,99,152,158,178,224,227,244,246–249]	12
	7	Recognise and value the diverse skillset of research management and technical staff (and early career researchers), and provide opportunities for them to host and supervise researchers, apply for research grants and undertake research[41,45,59,95,158,227,231,239,246]	9
Measuring success that rewards contribution and open research practices	1	Ensure that the term research excellence is understood and qualified within assessment processes to minimise opportunities to reward individualism at the expense of the collaborative, and create environments that assess the performance of the collective rather than only individuals (e.g., performance-based research funding systems PBRFS, and productivity)[3,5,6,8,21,23,26,50,57,84,87–89,91,92,94,97,98,107,109,130,139,153,158,212,221,223,227,233–236,242,250–255]	39
	2	Reward multidisciplinary work through separate evaluation structures to encourage team science initiatives (consider including data sharing and collegiality as part of employment evaluation criteria)[23,24,26,41,43,49,87,89,98,99,101,109,154,164,206,215,220,222,226,235,236,242]	22
	3	Review how research is recognised, incentivised and rewarded (subjective and objective measures of quantity, quality and impact), including Key Performance Indicators (KPIs) and whether monitoring systems are contributing to optimum solutions (including financial support and elevating barriers)[3,8,23,26,50,84,92,98,109,178,217,221,232,237,239,241,243,252,254]	19
	4	Review, consider and evaluate the value, role, and purpose of incentives. Consider questions such as 'Do they foster scientific knowledge?' and 'Are large collaboratives, open science practices innovative enough?'[8,19,23,24,57,98,107,108,130,164,212,218,237,250]	14
	5	Reward credible research practices that are addressing problems with credibility, rigour, and reproducibility in grant guidelines (e.g., incorporating Registered Reports in two stage funding model). Seek to encourage practice across publishers and institutions to not disadvantage researchers who engage in open practices (consider frameworks to improve quality publication practices (QPPs))[8,23,24,45,98,108,227,233,237,240,247,250,256]	13
	6	Consider 'human-oriented' knowledge practices over 'output-oriented' practices so that researchers and educators are evaluated based on value, quality and contribution, including early career researchers[4,45,145,177,193,221,231,241,247]	9

Table 4. *Continued*

Key themes	No	Statements	No. refs
Ensure routes for development are inclusive and for everyone (regardless of position, role or discipline)	1	Develop and reward cross-disciplinary training and mentoring aligned with development of on the job skills to promote interdisciplinary insight[19,46,60,69,72,73,88–90,92,95,98,101,152,154,172,181,193,217,222,228,232,247–249,257]	26
	2	Invest capacity in fostering change for different specializations and teams to create a trusting environment for knowledge-exchange, particularly around inefficiencies and pressure on grant funding[23,26,41,43,45,49,59,87,89,98,99,101,109,164,177,220,222,223,226,235,236,243,258]	23
	3	Invest in leadership training and encourage a culture of knowledge sharing between senior leaders to foster a healthy work environment, in particular around Open Science, Open Research practice and competencies (including project management and oversight and training such as awareness and motivation)[8,19,23,24,60,98,108,152,164,172,178,222,228,230,243,247–250,257,259]	21
	4	Implement an Inclusive leadership programme, and promote the benefits of a collaborative rather than competitive research culture[19,57,59,60,107,130,154,158,172,225,227,229,230,241,259]	15
	5	Provide access to research capacity building activities that value research and provide access to resources[19,90,164,212,217,223,241,243,258]	9
Make use of or build on existing tools and initiatives to advance innovation	1	Centralize computing and experimental infrastructure to engage core facilities to provide data services, including ways to enhance productivity through social media use (and digitalisation)[3,6,8,21,23,24,26,50,84,87,88,91,92,97,98,109,139,154,227,233,236,245,246,250–252,254,255]	28
	2	Consider implementing a Complementary Capacity Building (CCB) programme to improve the sustainability of research partnerships (including productivity), with particular focus on LMIC research capacity (and identifying synergies between research and services for development (R&S4D)[6,8,21,23,26,50,84,87,88,90–92,94,97,98,139,153,221,223,234,236,250–252,254,255,258]	27
	3	Promote or encourage use of: the Open Science Framework platforms; project management tools designed to enhance transparency and foster collaborations; the Open Innovation Science (OIS) concept/framework; Network data centres and task forces (e.g., UK Reproducibility Network and developing framework/guidelines to enhance understanding); and implement and encourage use of contributorship approaches such as mandating the use of CRediT[7,24,107,130,178,215,233,260]	8
	4	Consider optimal models of collaboration which promote integration that is appropriate and relevant as different problems (including different countries) require different approaches[154,221,223,225,228,233]	6

The review revealed that the risks associated with a lack of diversity and inclusion often result in individuals leaving academia, low job satisfaction, increased stress, burnout and mental health problems, and decreased productivity.[18,44,74] The evidence suggests that these issues have an impact not only at the institutional level such as having a lack of diversity in organisational leaderships,[73,97,180] but also for individuals, leading to a lack of role models and peer mentors[163] skills shortages in particular disciplines, sectors and roles,[44,92,181] and drives off talent.[8] Moreover, the increasing demands of heavy workloads and the risk of perpetuating a culture of academic rejection can impact an individual's wellbeing.[18,46,47,106,182] Table 3 provides a summary of the key considerations associated to wellbeing and equality of opportunity.

The review illustrates that over the last three years, the COVID-19 pandemic has highlighted some important challenges to this already highly pressured working environment, with mixed effects.[18,44,74] Although, the pandemic has brought about challenges to the research workforce, there is also emerging evidence over the last two years showing the potential benefits and opportunities as a result of COVID-19.[18,44,64,73,74,97,177,194] For example, use of online platforms for training and teaching purposes has opened up opportunities to bring together specific communities and countries. The pandemic also initiated 'kindness in research' where empathy replaced the usual expectations on work-life balance.[73,97,180] The review also identified clear efforts to improve and raise awareness of the need for academia to embrace the EDI agenda through several initiatives, movements, and policy implementations (as detailed in Table 3). Most prominently, focusing on efforts to improve individuals' opportunities through networking, collaborations, mentoring and peer-to-peer support, balancing career, and family aspirations can help to guide inclusivity and strengthen infrastructure and local capacity.[171,177,183,205]

Teamwork and supportive working relationships

Collaboration, openness, and transparency were highlighted in the evidence as key indicators of success for driving forward a positive cultural change. However, the emerging evidence suggested that perverse incentives within the research ecosystem, a lack of training, opportunity, support, and infrastructure can undermine ambitions for change, which is further hampered by researcher perceptions.[4,24,60,154,181,218,219]

The evidence pointed to a range of barriers that have repercussions on the notion of teamwork, such as the ongoing tradition of first and last authors taking most or all of the credit for the work,[220] the use of 'gift authorship' to enhance research publication of academics with poor research performance,[5] and the pressures to have global impact on the scientific community through high-quality scientific writing.[164] Researchers are incentivized to attain research excellence, which can often result in hyper-competitiveness and unfair working practices.[4,19,24,50,59,88,89,206] The evidence further suggested that the Research Excellence Framework (REF) in the UK has been criticised as promoting competition between departmental colleagues rather than collaboration due to criteria on contributors and the increased demand on publications.[49,89]

These practices can have a detrimental impact for the promotion of research integrity and team science, especially for ECRs. Research careers encompass a range of roles, skills, and expertise but as the evidence suggests this is not universal, with some universities separating research active staff from colleagues such as research managers, technicians, administrators, and librarians, some of whom have research-level qualifications and experience.[41,99,158] Separation in this way could lead to inequality of how staff are included (or not), trained, mentored and perceived by fellow colleagues (see Table 4 for a summary of the key considerations associated to teamwork and supportive working relationships).

As the evidence has shown, working relationship challenges in research culture require structural changes by transforming people, places, and practices.[247] Any steps to reform will require accessibility to opportunities and resources that collectively bring research staff together in a unified and cohesive way to promote and create trust (rather than having intensive competitive pressures to achieve based on individual merit).[51,164,247]

The evidence reveals multiple layers of complexity around the notion of 'teamwork' and the interrelated social and environmental factors that unfortunately reinforce a status quo. For change to occur there needs to be synergy for collaboration to ensure individuals, Research Performing Organisations (RPOs), Research Funding Organisations (RFOs) and society share a unified approach to move beyond solitary, isolated teams to a deeper integration of multi-disciplinary/inter-disciplinary culture.[7,57] An inclusive, representative, and collaborative research environment contributes to improvement in researchers' sense of belonging and to positive cultural change.[206]

The identified evidence suggests that there is a need to take a holistic and integrated view of the intrinsic (those within disciplines) and extrinsic factors (those outside of disciplines) that affect the research environment to come up with novel ways to tackle the challenges with teamwork and collaboration to ensure openness and a cultural shift in the right

Table 5. Key concepts and statements associated to teamwork and supportive working relationships.

Key themes	No	Statements	No. refs
Incentives and innovation	1	Synthesize insights across multiple disciplines to help to unify collaborative practices and breakdown boundaries and disconnect to signal organisational values, such as the Open Innovation in Science (OIS) Research Framework (particularly for early career researchers, supervisors, technicians), enabling change to the research ecosystem becoming interoperable and responsive to the open assess movement[7,8,19,23,26,43,49,55,84–86,92,98,101,109,119,126–128,151,156,192,224,234–236,241,263–278]	43
	2	Encourage greater efficiency and use of innovative and alternative approaches such as alternative publishing models (e.g., Octopus); registering with Center for Open Science; methods to assess research and researchers (e.g., SPACE); and, Open Knowledge Indicators, mapping diversity, communication and coordination[23,55,85,108,127,151,162,169,208,216,237,247,256,261,263–265,279–291]	30
	3	Prioritise shared decision making to ensure all perspectives of the full research eco system are captured, to initiate change in practice, including policy makers, funders, publishers, technicians, researchers, institution leaders, editors, including level of appropriateness for performance based funding schemes[5,26–28,36,84,85,92,98,127,138,151,156,224,233,236,244,257,268,278,283,287,288,292–296]	28
	4	Maintain hiring, appointment and promotional policies are fair and not solely based on authorship, publications or secured grants, and value softer skills[24,55,85,135,136,169,216,231,237,247,256,257,263,264,275,279,297–306]	26
	5	Develop a coordinated approach to incentivize open access policies to optimise a positive cultural shift based on Government recognition of UK Research and Innovation's position on open access research practice, (including European and international position and status of progression/advancement in open research)[8,27,85,98,126,135,162,218,250,268,271,272,274,275,288,301,306,307]	18
	6	Ensure continued monitoring and evaluation, including meta-research/research on research takes place to avoid unintended consequences, efficient use of resources and demonstrate which aspects are beneficial to the research ecosystem (including where improvements are required at institutional and professional level)[21,200,247,261,288,296,304,308–312]	12
Creation and facilitation	1	Monitor, evaluate and embed learning from education, training, supervision and mentoring to improve research integrity and to create a responsible research culture that is not individualized (including publishing culture built on individual reputation and rankings) but is a collective role in promoting and fostering research/academic integrity, through initiative such as open science peer networks, not to capitalize on individual researchers compliance[4,19,21,26,43,55,76,85,98,101,106,108–110,119,121,126,127,129,138,151,169,185,210,234–236,241,247,250,253,256,257,261–264,268,272,277,278,280–283,285–287,289,294,300,308,309,311,313–331]	74
	2	Adopt open practices early on at all staff levels, but also at the institutional and funders level particularly around software and digital tools (including social media, Artificial Intelligence capabilities, the digital context, management tools), publishing mechanisms, workflows, ethics and data accessibility, supporting collaborations and training progression[36,43,55,56,70,72,76,85,86,99,101,106,108,110,119,121,129,142,162,214,233,237,241,253,257,260,263,264,266,284,286,287,290–292,304,308,309,316,317,321,323,326,332–342]	71
	3	Ensure alignment between grant funding and publication outputs as well as consistency with open research initiatives, and opportunities to create mechanisms for reproducibility so greater collaboration can be gained, including understanding of authorship/contributorship consideration[8,19,24,55,84,85,98,127,135,136,151,169,231,233,235,237,241,250,251,255–257,262,264,274,276,279,280,284–288,291,298,299,301,302,305,306,319,327,329,343,344]	46
	4	Coordinate and facilitate research integrity officers/champions to promote and create a responsible research culture, including opportunities for an academic integrity framework for policy and practice (including institutional improvements and avoiding the persistence of behaviors detrimental to reproducibility while encouraging responsible research conduct)[19,21,28,43,76,84,98,101,106,110,119,121,127,151,210,235,236,251,255,262,272,277,278,280,285,286,288,294,296,309,311,313,314,318,322,324,326–331,345]	44
	5	Support Responsible Research Practices (RRP) as they require facilitation, advice and steer from the Government, funding organisations and academic institutions (progression and progress cannot be done in isolation). Such activity should consider six key areas: research policies; research practices; training researchers; evaluating research (ers); rewarding researchers; funding research (ers)[4,27,43,56,70,72,76,85,86,92,98,99,101,106,108,110,119,121,129,156,185,233,247,277,281,286,294,298,307,309,314,315,323,325,326,346]	36
	6	Enable researchers to have a voice in articulating (and contextualizing) how research could be evaluated and provide a mechanism for more detailed and transparent reporting of scholarly activities, using formal evaluative systems that explicitly captures behaviors that support reproducibility[36,84,127,128,131,151,227,235,251,255,262,272,273,276,280,285,286,288,297,312,327,329,332,333,347,348]	26

Table 5. *Continued*

Key themes	No	Statements	No. refs
Fostering transparency and visibility	1	Provide clarity, transparency and understanding of research mandates, policies and procedures to permit and maintain productivity in research for all staff and students (including career advantages), across all disciplines (acknowledging the reproducibility networks)[4,8,22,23,26,36,43,84,86,92,97,101,115,127,128,138,142,151,156,162,185,192,227,234–236,241,250–252,254,255,262,267,269,270,272–276,278,280,285,286,288,297,312,314–316,326,327,329,333,337,343,349]	58
	2	Support open research to allow research to be more reliable by sharing protocols, data, reproduction of analyses, and offers greater scrutiny to ensure good quality and replication of findings is critical to increase reliability and benefit all researchers, at all levels (making research accessible), including knowledge exchange[8,19,36,84,85,98,127,128,142,151,162,208,233–235,250,251,253,255,257,262,273,276,280,281,285,286,288,290,297,298,301,304,314,316,317,321,327,329,332,333,335,337,339,341,343,347,350,351]	51
	3	Gain greater understanding and consideration of existing steps to promote open science practices such Center for Open Science and its pre-registration process (https://cos.io/prereg/); Editor's Code of Ethics (http://editorethics.uncc.edu/); Committee of Publication Ethics (COPE, http://publicationethics.org/); Transparency and Openness Promotion (TOP) guidelines; Open Science Grid (http://opensciencegrid.org/); Open Knowledge institutions (OKIs); European Network of Research Integrity; SPACE (SPACE is a rubric for analyzing institutional progress indicators and conditions for success); Open Government Data Act; FAIR (findable, accessible, interoperable, and reusable); alternative repositories for open access publications (University Journals)[21,23,43,76,85,98,106,108,110,119,121,127,151,208,236,262,278,280–282,285–287,289,292,303,304,323,326–330,334,338,340,344]	38
	4	Increasingly adopt and promote publicly available data sets shared through repositories (e.g., Figshare, Zenodo), data management techniques, open materials and open data badges through the Center for Open Science, increasingly being mandated by funders and journals (including networks such as the Open Traits Network and toolkits for open access, and self-assessment of digital research)[3,8,23,26,49,56,84,85,98,108,109,127,129,151,156,208,224,250,252,254,260,266,274,280,282,284–287,289,317,321,328,332,336,337,342]	37
	5	Ensure scholarly outputs are credited using alternative contributorship models (e.g., CREDiT) and moving away from the traditional authorship models including becoming more preventative than reactive[21,24,76,85,136,231,279,284,288,298,302,305]	12
	6	Incorporate and consider web-based tools such as Open Science Framework (OSF), Open Knowledge Institutions framework (OKIs) to increase transparency and visibility of research at an international, global and institutional level[23,108,127,208,260,280,282,285,286,289,317,343]	13
	7	Become a signatory of initiatives such as DORA involvement with the Reproducibility Networks at local, institutional and sectoral level (UKRN Committee, 2021)[22,27,36,98,260,261,268,304,312,329]	10

direction.[7] Given the growing evidence that success in research and innovation requires diversity in roles, knowledge, and skills, an inclusive, representative, and collaborative research environment contributes to improvement in researchers' sense of belonging and to positive cultural change is required.[206]

Research quality and accountability – open and trustworthy research

From the existing evidence it was clear that transparency, open research, and integrity requires collaboration from RPOs, RFOs, researchers, publishers, and other sectoral organisations such as industry.[27,260,261] A large proportion of the evidence (more than a quarter of articles (133/253) included from the database searches and half of the grey literature (52/102)) highlighted several issues inhibiting open research practices, which some have termed as a 'replication or reproducibility crisis'.[24,86,216,235,237,257,262] These increasing pressures on researchers suggest that it is causing a 'publish or perish' practice, and has meant that researchers are prioritising 'getting it published' rather than 'getting it right'.[24,86,235,237,254,255,257]

However, as noted by Munafo (2022), the replication crisis could be regarded as an opportunity to promote motivation for improvements. Determining where effort is most needed and what changes are required, not only provides opportunity for the research ecosystem but also how RPOs and RFOs can mandate open research practices, and therefore coordinate change at both research integrity and researcher integrity level[261] (see Table 5 for a summary of the key considerations associated to teamwork and supportive working relationships)

The existing evidence demonstrated that open research practices (e.g., research integrity, researcher integrity, open data, open access and transparency) requires a global effort, as well as involvement from all sectors of the research ecosystem (e.g., institutions, researchers, funding organisations, publishers, industry). However, more evidence is needed to demonstrate where and in what circumstances the change is having tangible benefit.[43,260,261,282,329]

As the evidence suggests, practices should be evaluated to assess whether change has been of value, enhancing the research pathway and algin to be evidence informed, therefore avoiding any unintended consequences.[5,7,135,261,272] Meta research (e.g., research on research, meta science) is one way to evaluate and evidence any innovation taking place, and therefore determine the impact and tangible benefit of these changes to promote and enhance the research ecosystem.[7,24,36,247,261,281,329,341]

The evidence found several initiatives such as the UK Reproducibility Network (UKRN), Declaration on Research Assessment (DORA), and the European Network of Research Integrity (ENRI) to promote, encourage and prioritise the facilitation and creation of open research practices.[7,22,281,285,325] Adopting such initiatives enhances innovation across all aspects of the research ecosystem but there is variation on how far they have been implemented (including what stage of the development) and the acceptance level from researchers, RPOs and RFOs.[303,322,325,330]

Discussion

From the evidence, it was clear that there were several initiatives to seek a cultural change across the research institutions/ Higher Education Institutions. Although this was promising to see, the commitment is complex considering the multifaceted structures and processes governing the research ecosystem. Adding to the complexity, is the acknowledgement from research institutions that they too have a role to play in not only supporting research staff, at all levels, but also recognise the role and function of research management staff.[76,85,114,137,156,229] As noted in the recent Research and Development report on people and culture strategy, high quality research and innovation requires an acknowledgment of the full range of people needed.[8] An inclusive, representative and collaborative research environment contributes to improvement in researchers' sense of belonging and to positive cultural change.[206]

The increasing competitiveness within the research environment, with research funding organisations (RFOs) placing greater focus on impact rather than creativity and innovation, is causing a global initiative for cultural change. The health of the research group and those that lead them has been identified as an area that universities need to pay more attention to, rather than centering on individual researchers, particularly in the context of preventing research misconduct.[43] Team leaders play an important role in creating trustful environments, which support knowledge exchange processes and open research[164] and crucially they act as mentors and role models for research integrity and working practices.[43,92]

There was a strong sense and recognition of the value and importance of research capacity building, and the evidence clearly provided a wealth of initiatives to embark on. Interestingly, models, approaches and initiatives for capacity building have been reported by several countries.[57,70,90,103,130,133,159,223,310,352] Initiatives taking place in many countries, emphasising the benefits of learning from experiences in other countries was encouraging to report from the literature. Factoring some of these initiatives, it is evident that academia is confronting the challenges 'head on' to build a

more sustainable and credible research environment.[20,162,216] Although this is promising, the evidence suggests that research institutions must not assume that 'one size fits all'. There is diversity across disciplines, research staff (research, education, enterprise, and professional services) and several types of research institutions. To enhance research culture, different solutions will require different approaches at individual, institutional and systemic levels.

Over the last five years, and particularly the last two years (i.e., post the COVID-19 pandemic), there is a surge of evidence to capture the effects of these challenges and barriers and how these failings in our research ecosystem can be mitigated. Much of the literature focusing on career stability, job security and career progression suggested the need to build research capacity that spans across research, education, enterprise, and professional services. However, with this comes new challenges and pressures for teaching staff to also mentor, support and educate, whilst also having committed time to conduct their own research.[7,24,44,50,73,74,97,177,194,337]

Guidance on how to create a global long-term sustainable model that has representation at all levels is going to take time, and the COVID-19 pandemic has aggravated this already challenging and highly pressured working environment.[18,44,73,74] The COVID 19 pandemic may have perhaps initiated more transparency on obtaining a work/life balance, particularly at a time when many parents across the world were not only managing increasing work demands but also having to manage home life and home schooling simultaneously. The effect of the COVID-19 pandemic has started to emerge in the literature, particularly how additional burden placed on women reduced their productivity far more than men with women having 'borne the brunt of the pandemic in academic settings.'[177] There has been a steady increase in mental health distress arising from COVID-19 pandemic reported, which added to the existing strain in academia can often feel detrimental to an individual's career.[18]

However, despite the pandemic causing global disruption and concern, it has initiated new opportunities to bring communities and countries together using digital tools.[194,241,245,257,264,332,342,344] Research, training and teaching took place online, and the evidence seemed to suggest that offering greater accessibility through virtual platforms goes some way to reform the connectivity and diversity of the research environment. A good example of this is virtual conferences, as those with accessibility issues, family commitments, funding limitations and research communities from Low- and Middle-Income Countries (LMIC) now can attend, where they could not before.[208,245] Any changes will inevitably take time, but small improvements over time can have an impact, affecting both research institutions and funding organisations.[180] In addition, the pandemic provided the impetus to embed kindness in research where empathy replaced the usual expectations on work-life balance,[97] and researchers who felt supported during the pandemic tended to have better indicators of well-being.[73,74]

Given the growing evidence that success in research and innovation requires diversity in roles, knowledge, and skills, embedding a research culture of inequality between career types within the same research team discourages a culture of collaboration and appreciation of a diversity of roles, specialisations and contributions.[41,164] With increasing demands to incentivise and promote change it is necessary to acknowledge that both funding organisations and research institutions have responsibility to transform and shape best practice in research. Providing opportunities for research staff to combine their academic research with work in other sectors could bring more value to academia and strengthen the synergies for cultural change in the long-term.[153]

Study strengths and limitations

The main strength of the review was using several systematic database literature searches, which was complemented with additional grey literature searches of known online education articles and websites. However, a limitation is that scoping reviews only map the evidence and do not assess the quality of the articles or risk of bias. Most of the database articles had an international focus, with most of them from USA, Canada (28.0%) and other international countries (27.2%). For a large proportion of the grey literature, it was not possible to ascertain the articles countries region. Moreover, on a pragmatic basis, news items from news organisations based outside of UK, Europe, Norther America, and Australia were excluded, which along with the exclusion of non-English language documents means that other initiatives being used to improve research culture may well have been missed. On this basis, there could have been international and regional biases, but it could also be that there is a lack of evidence from these regions rather than missing articles from the systematic searches.

The review found more than 200 articles from the systematic database searches (n=253) and more than 100 from the grey literature searches (n=102) which suggested that there is growing literature around what constitutes a 'good' research culture and what this could look like. However, as the literature has shown, progress has been slow and although the evidence provided several examples of established initiatives and networking opportunities, the evidence was more anecdotal, and opinion focused.

Conclusions

The review has shown that there is a wealth of evidence suggesting how and where changes are needed to establish a global cultural change to the research ecosystem. However, research organisations cannot act in isolation. Individuals, research organisation and funding organisations need to be responsible and work together; to uphold and ensure fair and transparent policies and governance. Change will not happen overnight, but by working together in a collaborative and diverse way to ensure all views, opinions and expectations are fully inclusive that strengthen and enhance research culture for the better.

The barriers to a sustainable research culture are complex and underneath linger more multi-faceted challenges, such as the impact on the wellbeing of research staff, resistance to innovation, equity for research institution staff and career progression.[28,62,64,85,195,260,336] Adding to the complexity is the increasing pressure for academic institutions, research groups, disciplines, and researchers to demonstrate impact. The growing focus on performance measures has undoubtedly caused unintended consequences for the whole research ecosystem. This model is not sustainable, not only for the quality of research and trust in research, but also for the next generation of talented researchers. Researchers are leaving academia, leaving behind a career that should be fostering innovation and building research capacity at its core. Removing such barriers and adopting best research practice and enhancing the diversity of opportunities for all is ultimately down to everyone working within the research environment.

Ethics and consent

Ethical approval and written consent statement were not required.

Authors' contributions

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Data availability statement

All underlying data are available as part of the article and no additional source data are required.

Underlying data

OSF: A scoping review on what constitutes a good research culture. https://osf.io/wjhcf/.[353]

This project contains the following underlying data:

- Fig 1 PRISMA flow diagram (PRISMA)
- Fig 2 themed areas diagram (four areas of statements diagram)
- S1 Appendix search terms and key words (search terms and key words)
- S2 Appendix PRISMA ScR checklist (completed checklist)

- S1 Table database searches examples (search strategies used)
- S2 Table database lit articles (complete list of included articles in the review)
- S3 Table grey lit articles (complete list of included articles from the grey literature in the review)

Extended data

Reporting guidelines

OSF repository: PRISMA ScR checklist and flow chart for "A scoping review on what constitutes a good research culture." https://osf.io/wjhcf/.[353]

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References

1. Hunter J, McKernan R, Rankin S, *et al.*: **Seven principles to change the UK's research culture.** *Times Higher Education.* 2020.
2. Jong L, Franssen T, Pinfield S: *'Excellence' in the Research Ecosystem: A Literature Review.* Research on Research Institute; 2021.
3. Else H: **Impact factors are still widely used in academic evaluations.** *Nature.* 2019.
PubMed Abstract | Publisher Full Text
4. Xu X, Oancea A, Rose H: **The Impacts of Incentives for International Publications on Research Cultures in Chinese Humanities and Social Sciences.** *Minerva.* 2021; **59**(4): 469–492.
Publisher Full Text
5. Buckle RA, Creedy J: **Methods to evaluate institutional responses to performance-based research funding systems.** *Aust. Econ. Pap.* 2022; **61**: 615–634.
Publisher Full Text
6. Gadd E: **Metistalk.** 2022.
Reference Source
7. Beck S, Bergenholtz C, Bogers M, *et al.*: **The Open Innovation in Science research field: a collaborative conceptualisation approach.** *Ind. Innov.* 2022; **29**(2): 136–185.
Publisher Full Text
8. BEIS: **Research and development (R&D) people and culture strategy. In: Industry DfBE, editor.** 2021.
9. Inorms: **SCOPE Framework for Research Evaluation.** Last accessed 22/02/2023.
Reference Source
10. DORA: **The Declaration on Research Assessment.** Last accessed 22/02/2023.
Reference Source
11. Hicks D, Wouters P, Waltman L, *et al.*: **Bibliometrics: The Leiden Manifesto for research metrics.** *Nature.* 2015; **520**(7548): 429–431.
PubMed Abstract | Publisher Full Text
12. ISRIA: **The International School on Research Impact Assessment.** Last Accessed 22/02/2023.
Reference Source
13. Agate N, Long CP, Russell B, *et al.*: *Walking the Talk: Toward a Values-Aligned Academy.* HuMetricsHSS; 2022.
Publisher Full Text
14. Wellcome: **Research culture: let's reimagine how we work together.** Last accessed 22/02/2023.
Reference Source
15. Wellcome: **What researchers think about the culture they work in.** Last accessed 22/02/2023.
Reference Source
16. Jo Billings: **Research culture: what researchers think of the culture they work in.** Last accessed 22/02/2023.
Reference Source
17. Ullrich LE, Ogawa JR, Jones-London MD: **Factors that influence career choice among different populations of neuroscience trainees.** *eNeuro.* 2021; **8**(3): ENEURO.0163–ENEU21.2021.
PubMed Abstract | Publisher Full Text | Free Full Text
18. Limas JC, Corcoran LC, Baker AN, *et al.*: **The Impact of Research Culture on Mental Health & Diversity in STEM.** *Eur. J. Chem.* 2022; **28**(9).
Publisher Full Text
19. Grant S, Wendt KE, Leadbeater BJ, *et al.*: **Transparent, Open, and Reproducible Prevention Science.** *Prev. Sci.* 2022; **23**: 701–722.
Publisher Full Text
20. Erickson M, Walker C, Hanna P: **Survey of academics finds widespread feelings of stress and overwork.** *The Conversation.* 2020.
Reference Source
21. Marinetto M: **How can we tackle the thorny problem of fraudulent research?** *The Guardian.* 2017.
22. UK Research and Innovation: **Enhancing research culture funding allocations 2021 to 2022.** Last accessed 22/02/2023.
Reference Source
23. Horn L, Bouter L: **Researchers should be assessed on quality not quantity: here's how.** *The Conversation.* 2022.
Reference Source
24. Kowalczyk OS, Lautarescu A, Blok E, *et al.*: **What senior academics can do to support reproducible and open research: a short, three-step guide.** *BMC. Res. Notes.* 2022; **15**(1): 116.
PubMed Abstract | Publisher Full Text | Free Full Text
25. Manville C, d'Angelo C, Culora A, *et al.*: **Understanding perceptions of the Research Excellence Framework among UK researchers.** 2021.
26. The Royal Society: **Research culture embedding inclusive excellence: Insights on the future culture of research.** 2017.
27. Stewart SLK, Pennington CR, da Silva GR, *et al.*: **Reforms to improve reproducibility and quality must be coordinated across the research ecosystem: the view from the UKRN Local Network**

Leads. *BMC. Res. Notes.* 2022; **15**(1): 58.
PubMed Abstract | Publisher Full Text | Free Full Text

28. Ross-Hellauer T, Reichmann S, Cole NL, *et al.*: **Dynamics of cumulative advantage and threats to equity in open science: a scoping review.** *R. Soc. Open Sci.* 2022; **9**(1).
PubMed Abstract | Publisher Full Text | Free Full Text

29. Sørensen MP, Ravn T, Marušić A, *et al.*: **Strengthening research integrity: which topic areas should organisations focus on?** *Hum. Soc. Sci. Comm.* 2021; **8**(1).
Publisher Full Text

30. JBI: **Scoping Review Network.** Last accessed 17/02/2023.
Reference Source

31. Peters MDJ, Marnie C, Tricco AC, *et al.*: **Updated methodological guidance for the conduct of scoping reviews.** *JBI Evid. Implement.* 2021; **19**(1): 3–10.
PubMed Abstract | Publisher Full Text

32. Khalil H, Peters MD, Tricco AC, *et al.*: **Conducting high quality scoping reviews-challenges and solutions.** *J. Clin. Epidemiol.* 2021; **130**: 156–160.
PubMed Abstract | Publisher Full Text

33. Cai Y, Amaral M: **The triple helix model and the future of innovation: a reflection on the triple helix research agenda.** *Triple Helix.* 2021; **8**(2): 217–229.

34. Halilem N: **Inside the Triple Helix: An Integrative Conceptual Framework of the Academic Researcher's Activities, a Systematic Review.** *J. Res. Adm.* 2010; **41**(3): 23–50.

35. Borkowski D, McKinstry C, Cotchett M, *et al.*: **Research culture in allied health: a systematic review.** *Aust. J. Prim. Health.* 2016; **22**(4): 294–303.
PubMed Abstract | Publisher Full Text

36. Munafo MR, Chambers CD, Collins AM, *et al.*: **Research Culture and Reproducibility.** *Trends Cogn. Sci.* 2020; **24**(2): 91–93.
Publisher Full Text

37. Stentiford L, Koutsouris G, Boyle C, *et al.*: **The structures and processes governing education research in the UK from 1990–2020: A systematic scoping review.** *Rev. Educ.* 2021; **9**(3).
Publisher Full Text

38. Slade SC, Philip K, Morris ME: **Frameworks for embedding a research culture in allied health practice: a rapid review.** *Health Res. Policy Syst.* 2018; **16**(1): 29.
PubMed Abstract | Publisher Full Text | Free Full Text

39. Allen J, Smith JL, Ransdell LB: **Missing or seizing the opportunity? The effect of an opportunity hire on job offers to science faculty candidates.** *Equal Diversity Incl.* 2019b; **38**(2): 160–177.
Publisher Full Text

40. Blackburn H: **The Status of Women in STEM in Higher Education: A Review of the Literature 2007–2017.** *Sci. Technol. Libr.* 2017; **36**(3): 235–273.
Publisher Full Text

41. Teperek M, Cruz M, Kingsley D: **Time to re-think the divide between academic and support staff.** *Nature.* 2022.
PubMed Abstract | Publisher Full Text

42. Hall R: **Are PhDs just cheap labour for universities?; PhD grads complain that there are too few academic jobs. Should universities support their postgrads into alternative careers?** *The Guardian (London).* 2019 01/04/2019.

43. Anon: **Integrity starts with the health of research groups.** *Nature.* 2017; **545**(7652): 5–6.
Publisher Full Text

44. Anon: **COVID is disrupting scientific careers around the world.** *Nature.* 2021; **599**: 179.
Publisher Full Text

45. Christian K, Johnstone C, Larkins JA, *et al.*: **A survey of early-career researchers in Australia.** *elife.* 2021; **10**(01): 11.
Publisher Full Text

46. Creaton J: **Addressing the mental health crisis.** *Nat. Rev. Cancer.* 2021; **21**(1): 1–2.
PubMed Abstract | Publisher Full Text | Free Full Text

47. Allen K, Donoghue G, Hattie J, *et al.*: **Journal papers, grants, jobs … as rejections pile up, it's not enough to tell academics to 'suck it up'.** *The Conversation.* 2021.
Reference Source

48. Grove J: **Research intelligence: big ideas to improve research culture.** *The Times Higher Education Supplement.* 2021.

49. Grove J: **Do national research assessment exercises still pass peer review?** *The Times Higher Education Supplement.* 2021. 02/09/2021.

50. Mrva-Montoya A, Luca E: **Book publishing sidelined in the game of university measurement and rankings.** *The Conversation.* 2021.
Reference Source

51. Cassuto L: **The Grief of the Ex-Academic.** *Chron. High. Educ.* 2018 25/02/2018.

52. Afonja S, Salmon DG, Quailey SI, *et al.*: **Postdocs' advice on pursuing a research career in academia: A qualitative analysis of free-text survey responses.** *PLoS One.* 2021; **16**(5 May): e0250662.
PubMed Abstract | Publisher Full Text | Free Full Text

53. Ahmed T, Johnson J, Latif Z, *et al.*: **MyNRMN: A national mentoring and networking platform to enhance connectivity and diversity in the biomedical sciences.** *Faseb Bioadvances.* 2021; **3**(7): 497–509.
PubMed Abstract | Publisher Full Text | Free Full Text

54. Barnes N, du Plessis M, Frantz J: **Institutional culture and academic career progression: Perceptions and experiences of academic staff.** *SA J. Ind. Psychol.* 2021; **47**: 47.
Publisher Full Text

55. de Herde V, Björnmalm M, Susi T: **Game over: Empower early career researchers to improve research quality.** *Insights UKSG J.* 2021; **34**: 1–6.
Publisher Full Text

56. Finkel A: **To move research from quantity to quality, go beyond good intentions.** *Nature.* 2019; **566**(297): 297.
PubMed Abstract | Publisher Full Text

57. Gibson C, Stutchbury T, Ikutegbe V, *et al.*: **Challenge-Led Interdisciplinary Research in Practice: Program Design, Early Career Research, and a Dialogic Approach to Building Unlikely Collaborations.** *Res. Eval.* 2019; **28**(1): 51–62.
Publisher Full Text

58. Griffith EE, Dasgupta N: **How the demographic composition of academic science and engineering departments influences workplace culture, faculty experience, and retention risk.** *Soc. Sci.* 2018; **7**(5).
Publisher Full Text

59. Jung J, Horta H, Zhang LF, *et al.*: **Factors fostering and hindering research collaboration with doctoral students among academics in Hong Kong.** *High. Educ.* 2021; **82**: 519–540.
Publisher Full Text

60. Maxwell TW, Chophel D: **The impact and outcomes of (non-education) doctorates: the case of an emerging Bhutan.** *High. Educ.* 2020; **80**(6): 1081–1102.
Publisher Full Text

61. Mendez S, Tygret JA, Conley VM, *et al.*: **Exploring the mentoring needs of early- And mid-career URM engineering faculty: A phenomenological study.** *Qual. Rep.* 2020; **25**(4): 891–908.

62. Owusu F, Kalipeni E, Awortwi N, *et al.*: **Building research capacity for African institutions: confronting the research leadership gap and lessons from African research leaders.** *Int. J. Leadersh. Educ.* 2017; **20**(2): 220–245.
Publisher Full Text

63. Panina SV, Arkhipova SN, Parnikova TA, *et al.*: **Student Career Choices before and during Quarantine Measures.** *Propositos Y Representaciones.* 2020; **8**: 8.
Publisher Full Text

64. Ransdell LB, Lane TS, Schwartz AL, *et al.*: **Mentoring new and early-stage investigators and underrepresented minority faculty for research success in health-related fields: An integrative literature review (2010-2020).** *Int. J. Environ. Res. Public Health.* 2021; **18**(2): 1–35.

65. Santos P, Patrício MT: **Academic culture in doctoral education: Are companies making a difference in the experiences and practices of doctoral students in Portugal?** *Int J Doctoral Studies.* 2020; **15**: 685–704.
Publisher Full Text

66. Shelton DS, Delgado MM, Greenway EVG, *et al.*: **Expanding the Landscape of Opportunity: Professional Societies Support Early-Career Researchers Through Community Programming and Peer Coaching.** *J. Comp. Psychol.* 2021; **135**(4): 439–449.
PubMed Abstract | Publisher Full Text | Free Full Text

67. Termini CM, Hinton AO Jr, Garza-López E, *et al.*: **Building Diverse Mentoring Networks that Transcend Boundaries in Cancer Research.** *Trends Cancer.* 2021; **7**(5): 385–388.
PubMed Abstract | Publisher Full Text | Free Full Text

68. Ullah S, Arabia DHA, Mansoor SN, *et al.*: **Beyond publish or perish: Promoting quality and increasing standards in medical research and writing.** *J. Pak. Med. Assoc.* 2018; **68**(5): 823–824.
PubMed Abstract

69. Aldercotte A, Guyan K, Lawson J, *et al.*: **ASSET 2016: Experiences of gender equality in STEMM academia and their intersections with ethnicity, sexual orientation, disability and age.** 2017.

70. Anon: *Workshop on 'Perspective of Manipuri Culture' to promote quality research.* India: Imphal Free Press; 2021c 21/01/2021.

71. Clynes M, Corbett A, Overbaugh J: **Why we need good mentoring.** *Nat. Rev. Cancer.* 2019; **19**(9): 489–493.
PubMed Abstract | Publisher Full Text

72. Gopalakrishna G: **Preprint advocates must also fight for research integrity.** *Nature.* 2021.
PubMed Abstract | Publisher Full Text

73. Gould J: **Kindness alone won't improve the research culture.** *Nature.* 2020. Podcast.
Publisher Full Text

74. Gould J: **The career costs of COVID-19: how postdocs and PhD students are paying the price.** *Nature.* 2020. Podcast.
Publisher Full Text | Reference Source

75. Guccione K: **Aren't they all leaving anyway? What's the value of mentoring early career research staff?** 2018.

76. Gunsalus CK, Robinson AD: **Nine pitfalls of research misconduct.** *Nature.* 2018; **557**(7705): 297–299.
PubMed Abstract | Publisher Full Text

77. Mejlgaard N, Bouter LM, Gaskell G, *et al.*: **Research integrity: nine ways to move from talk to walk.** *Nature.* 2020; **586**(7829): 358–360.
PubMed Abstract | Publisher Full Text

78. McKinsey & Company: **Bridging the challenge gap in Denmark.** 2018.

79. Moreau M, Bernard T: **Carers and Careers in Higher Education: What works?** *AdvanceHE.* 2018.
Reference Source

80. Sample I: **Researchers facing 'shocking' levels of stress, survey reveals; Nearly two thirds of those who took part had witnessed bullying or harassment.** *The Guardian (London).* 2020 15/01/2020.

81. Thomson R: **How we can turn the tide for women in science.** *The Conversation.* 2018.
Reference Source

82. Wells B: *University holds special academic meeting. The Marquette tribune.* Marquette University; 2021 04/05/2021.

83. Yelken Y: *The Aditi Leadership Programme: Developing the potential of Black, Asian and Minority Ethnic Leaders.* Advance HE; 2018.

84. Jones R, Wilsdon J: **The Biomedical Bubble: Why UK research and innovation needs a greater diversity of priorities, politics, places and people.** 2018.

85. Mejilgaard N, Bouter LM, Gaskell G, *et al.*: **Research integrity: nine ways to move from talk to walk.** *Nature.* 2020; **586**: 358–360.
PubMed Abstract | Publisher Full Text

86. Neff EP: **On the past, present, and future of in vivo science.** *Lab Anim.* 2021; **50**(10): 273–276.
Publisher Full Text

87. Norris D, Dirnagl U, Zigmond MJ, *et al.*: *Health tips for research groups.* Nature Publishing Group; 2018.

88. Powell K: **Should we steer clear of the winner-takes-all approach?** *Nature.* 2018; **553**(7688): 367–369.
PubMed Abstract | Publisher Full Text

89. Sibai O, Figueirdo B, Ferreira MC: **Overworked and isolated: the rising epidemic of loneliness in academia.** *The Conversation.* 2019.
Reference Source

90. Van Noorden R: **Some hard numbers on science's leadership problems.** *Nature.* 2018; **557**: 294–296.
PubMed Abstract | Publisher Full Text

91. Woolston C: **Feeling overwhelmed by academia? You are not alone.** *Nature.* 2018; **557**: 129–131.
Publisher Full Text

92. Anon: **Research institutions must put the health of labs first.** *Nature.* 2018; **557**: 279–280.
Publisher Full Text

93. Han X, Appelbaum RP: **China's science, technology, engineering, and mathematics (STEM) research environment: A snapshot.** *PLoS One.* 2018; **13**(4).
Publisher Full Text

94. Hartvigson L, Heshmati A: **Sustainability of Cooperation in the International Development of African Higher Education. Scan.** *J. Educ. Res.* 2022; **67**: 489–503.
Publisher Full Text

95. Sheikh A, Malik A, Mahmood K: **Research practices of LIS professionals in Pakistan: A study of attitudes, involvement and competencies.** *J. Inf. Sci.* 2020; **48**: 587–599.
Publisher Full Text

96. Burton MFZ, Cao XE: **Navigating mental health challenges in graduate school.** *Nat. Rev. Mater.* 2022; **7**(6): 421–423.
PubMed Abstract | Publisher Full Text | Free Full Text

97. Derrick G: **How COVID-19 lockdowns could lead to a kinder research culture.** *Nature.* 2020; **581**: 107–108.
PubMed Abstract | Publisher Full Text

98. Gottlieb G, Smith S, Cole J, *et al.*: *Realising Our Potential Backing Talent and Strengthening UK Research Culture and Environment.* Russell Group; 2021.

99. Anon.: **Research managers are essential to a healthy research culture.** *Nature.* 2021; **595**(150): 150.
Publisher Full Text

100. Azeem M, Mataruna L: **Identifying factor measuring collective leadership at academic workplaces.** *Int. J. Educ. Manag.* 2019; **33**(6): 1316–1335.

101. Chaplin K, Price D: **7 ways to promote better research culture.** 2018.

102. Halpern JB, Huber TE, Sinex SA, *et al.*: *Building a Dynamic University-Community College Partnership: The Second Decade of a Broad, Mutually Beneficial Materials Science Collaboration.* Materials Research Society; 2018.

103. Hammad W, Al-Ani W: **Building Educational Research Capacity: Challenges and Opportunities From the Perspectives of Faculty Members at a National University in Oman.** *SAGE Open.* 2021; **11**(3): 215824402110326.
Publisher Full Text

104. Malotky MKH, Mayes KM, Price KM, *et al.*: **Fostering Inclusion through an Interinstitutional, Community-Engaged, Course-Based Undergraduate Research Experience.** *J. Microbiol. Biol. Educ.* 2020; **21**(1).
PubMed Abstract | Publisher Full Text | Free Full Text

105. McAllister M, Donna LB: **'Pre-Run, Re-Run': An innovative research capacity building exercise.** *Nurse Educ. Pract.* 2017; **27**: 144–150.
PubMed Abstract | Publisher Full Text

106. Marín-Spiotta E: **Harassment should count as scientific misconduct.** *Nature.* 2018; **557**(7704): 141.
PubMed Abstract | Publisher Full Text

107. Russell S, Foulkes I: **Embedding a positive research culture that fosters innovation.** *Nat. Rev. Cancer.* 2019; **19**(5): 241–242.
PubMed Abstract | Publisher Full Text

108. Schiermeier Q: **Data management made simple.** *Nature.* 2018; **555**: 403–405.
Publisher Full Text

109. Wellcome: **esponsible conduct of research.** 2022.
Reference Source

110. Winchester C: **Give every paper a read for reproducibility.** *Nature.* 2018; **557**(7706): 281–282.
PubMed Abstract | Publisher Full Text

111. Woolston C: **PhDs: the tortuous truth.** *Nature.* 2019; **575**: 403–406.
PubMed Abstract | Publisher Full Text

112. Devi G, Sudan R, Freel S, *et al.*: **2305: Advancement of translational sciences: developement of an INTL! - erprofessional program and outcome measures for foundational, clinical, and health care researchers.** *J. Clin. Transl. Res.* 2017; **1**: 47.
Publisher Full Text

113. Juvonen S, Nurkka P, Vakevainen K, editors. **Experiences of cooperation between a higher education institution and industry and its impact on working culture 11th International Conference on Technology, Education and Development (INTED); 2017 2017 Mar 06-08; Valencia, SPAIN.** 2017.

114. Langhaug LF, Jack H, Hanlon C, *et al.*: **"We need more big trees as well as the grass roots": going beyond research capacity building to develop sustainable careers in mental health research in African countries.** *Int. J. Ment. Heal. Syst.* 2020; **14**: 1–14.

115. Abe I, Mugobo V: **Low research productivity: Transformation, institutional and leadership concern at a South African University.** *Perspect. Educ.* 2021; **39**(2): 113–127.
Publisher Full Text

116. Lorenz-Meyer D: **The Academic Productivist Regime: Affective Dynamics in the Moral-Political Economy of Publishing.** *Sci. Cult.* 2018; **27**(2): 151–174.
Publisher Full Text

117. Madia Lourenco LH, Baker BL, Dias Junior AG, *et al.*: **Engaging local health research communities to enhance long-term capacity building in Brazil.** *BMJ Glob. Health.* 2021; **6**(10): 10.

118. Angelini D: **Swindon consultant creates uni course to improve women's confidence in male-dominated jobs.** *Swindon Advertiser.* 2020 03/08/2020.

119. Anon: **How to grow a healthy lab.** *Nature.* 2018; **557**: 293.
Publisher Full Text

120. Dougherty S, Ecton W: **How better funding can increase the number and diversity of doctoral students.** *The Conversation.* 2021.
Reference Source

121. Grove J: **India to train researchers in how to spot predatory journals.** *The Times Higher Education Supplement.* 2020 23/01/2020.

122. Christian K, Johnstone C, Larkins JA, *et al.*: **Why have eight researcher women in STEMM left academic research, and where did they go?** *Int. J. Acad. Dev.* 2021; **28**: 31–44.
Publisher Full Text

123. Dowey N, Barclay J, Fernando B, *et al.*: **A UK perspective on tackling the geoscience racial diversity crisis in the Global North.** *Nat. Geosci.* 2021; **14**(5): 256–259.
Publisher Full Text

124. Heng K, Hamid MO, Khan A: **Research engagement of academics in the Global South: the case of Cambodian academics.** *Glob. Soc. Educ.* 2022; **21**: 322–337.
Publisher Full Text

125. Hishan SS, Ramakrishnan S, Mansor NNBA: **Research engagement of foreign language teachers among select higher education institutions in Malaysia.** *Rupkatha J. Interdiscip. Stud. Humanit.* 2020; **12**(1).
Publisher Full Text

126. Jessani NS, Valmeekanathan A, Babcock CM, *et al.*: **Academic incentives for enhancing faculty engagement with decision-makers-considerations and recommendations from one School of Public Health.** *Humanit. Soc. Sci. Commun.* 2020; **7**(1).
Publisher Full Text

127. Pauliuk S: **Making sustainability science a cumulative effort.** *Nat. Sustain.* 2020; **3**(1): 2–4.
Publisher Full Text

128. Pownall M, Talbot CV, Henschel A, *et al.*: **Navigating Open Science as Early Career Feminist Researchers.** *Psychol. Women Q.* 2021; **45**(4): 526–539.
Publisher Full Text

129. Universities New Zealand: **Tauira Māori Initiatives – Sharing good practice in New Zealand universities.** 2018.

130. McGinn MK, Niemczyk EK: **Team dynamics and learning opportunities in social science research teams.** *Alta. J. Educ. Res.* 2020; **66**(4): 364–386.

131. Faure C, Munung NS, Ntusi NAB, *et al.*: **Considering equity in global health collaborations: A qualitative study on experiences of equity.** *PLoS One.* 2021; **16**(10 October): e0258286.
PubMed Abstract | Publisher Full Text | Free Full Text

132. Gong Y, MacPhail A, Young AM: **Chinese higher education-based physical education teacher educators' professional learning needs for involvement in research activities.** *Prof. Dev. Educ.* 2021; 1–17.
Publisher Full Text

133. Haja W: **OC 8586 Institutional research capacity building for multi-disciplinary health research to support the health system rebuilding phase in sierra leone.** *BMJ Glob. Health.* 2019; **4**(Suppl 3): A15.1–A1A15.
Publisher Full Text

134. Malekzadeh A, Michels K, Wolfman C, *et al.*: **Strengthening research capacity in LMICs to address the global NCD burden.** *Glob. Health Action.* 2020; **13**(1): 1846904.
PubMed Abstract | Publisher Full Text | Free Full Text

135. Muthama E, McKenna S: **The unintended consequences of using direct incentives to drive the complex task of research dissemination.** *Educ. Change.* 2020; **24**: 1–23.

136. Norman MK, Mayowski CA, Fine MJ: **Authorship stories panel discussion: Fostering ethical authorship by cultivating a growth mindset.** *Account. Res.* 2021; **28**(2): 115–124.
PubMed Abstract | Publisher Full Text

137. Oancea A, Fancourt N, Robson J, *et al.*: **Research capacity-building in teacher education.** *Oxf. Rev. Educ.* 2021; **47**(1): 98–119.
Publisher Full Text

138. Uhlmann EL, Ebersole CR, Chartier CR, *et al.*: **Scientific Utopia III: Crowdsourcing Science.** *Perspect. Psychol. Sci.* 2019; **14**(5): 711–733.
PubMed Abstract | Publisher Full Text

139. Tregoning J: **Will my popular science book bring any career benefits?** *The Times Higher Education Supplement.* 2021 14/10/2021.

140. de Jager P, Lubbe I, Papageorgiou E: **The South African chartered accountant academic: Motivations and challenges when pursuing a doctoral degree.** *Meditari. Account. Res.* 2018; **26**(2): 263–283.
Publisher Full Text

141. Gaikwad P: **Balancing research productivity and teaching by faculty in higher education: A case study in the philippines.** *J. High Educ. Theory Pract.* 2021; **21**(7): 181–192.

142. Inga E, Inga J, Cárdenas J, *et al.*: **Planning and strategic management of higher education considering the vision of latin america.** *Educ. Sci.* 2021; **11**(4).
Publisher Full Text

143. Nhem D: **Quality in higher education: what do students in Cambodia perceive?** *Tert. Educ. Manag.* 2022; **28**(1): 43–59.
Publisher Full Text

144. Wilson C, Hirtz M, Levkin PA, *et al.*: **Facilitating an International Research Experience Focused on Applied Nanotechnology and Surface Chemistry for American Undergraduate Students Collaborating with Mentors at a German Educational and Research Institution.** *J. Chem. Educ.* 2019; **96**(11): 2441–2449.
PubMed Abstract | Publisher Full Text | Free Full Text

145. Delbari S, Rajaipour S, Abedini Y: **Investigating the relationship between career development and productivity with the mediating role of self-regulation among university staff.** *J. Appl. Res. High Edu.* 2020; **13**(3): 759–781.
Publisher Full Text

146. Babalola OO, du Plessis Y, Babalola SS: **Insight into the Organizational Culture and Challenges Faced by Women STEM Leaders in Africa.** *Soc. Sci. (Basel).* 2021; **10**(3).
Publisher Full Text

147. Wolter I, Ehrtmann L, Seidel T, *et al.*: **Social or Economic Goals? The Professional Goal Orientation of Students Enrolled in STEM and Non-STEM Majors in University.** *Front. Psychol.* 2019; **10**.
PubMed Abstract | Publisher Full Text | Free Full Text

148. Davis D, Garbarino J, Bahia P, *et al.*: **Recommendations for the Continued Professionalization of Science Outreach within the Scientific Enterprise (SciOut18).** *Figshare.* 2020.

149. Slovacek S, Miu V, Soto K, *et al.*: **Supporting STEM in Higher Education.** *J. Int. Educ. Pract.* 2019; **7**(4): 438–449.
Publisher Full Text

150. Bond M, Marín VI, Bedenlier S: **International Collaboration in the Field of Educational Research: A Delphi Study.** *J. New Approaches Educ. Res.* 2021; **10**(2): 190–213.
Publisher Full Text

151. Bishop DVM, Bates T, Loryman C, *et al.*: **What can be done to improve research integrity?.** *The Times Higher Education Supplement.* 2022 20/01/2022.

152. Kwok R: **How lab heads can learn to lead.** *Nature.* 2018; **557**(7706): 457–459.
PubMed Abstract | Publisher Full Text

153. Saric J, Käser F, Lys JA, *et al.*: **Synergising research and service activities at swiss research institutions to accelerate sustainable development.** *Sustainability.* 2021; **13**(17).
Publisher Full Text

154. Way GP, Greene CS, Carninci P, *et al.*: **A field guide to cultivating computational biology.** *PLoS Biol.* 2021; **19**(10): e3001419.
PubMed Abstract | Publisher Full Text | Free Full Text

155. Strinzel M, Brown J, Kaltenbrunner W, *et al.*: **Ten ways to improve academic CVs for fairer research assessment.** *Hum. Soc. Sci. Comm.* 2021; **8**(1): 251.
Publisher Full Text

156. Stroobants K: **You can help to create a new researcher-reward system.** *Nature.* 2021.
PubMed Abstract | Publisher Full Text

157. Grove J: **Retirement planning: Do compulsory retirement ages benefit the academy?** *The Times Higher Education Supplement.* 2018 13/12/2018.

158. Hanson A, Bullers K, Howard AM, *et al.*: **Using a Reflexive Process to Investigate Organizational Change: The Use of the Research Spider Matrix.** *Med. Ref. Serv. Q.* 2019; **38**(4): 312–325.
PubMed Abstract | Publisher Full Text

159. Achmad S, Badu SQ, editors. **Cultural Quality Revitalization Model in Strengthening The Higher Education Capacity Building 'Good Learning Culture'.** *1st Yogyakarta International Conference on Educational Management/Administration and Pedagogy (YICEMAP); 2017 2017 May 13; Yogyakarta, INDONESIA.* 2017.

160. Rowtho V, Gopee S, Hingun A: **Doctoral boot camps: from military concept to andragogy.** *Educ. Train.* 2020; **62**(4): 379–392.
Publisher Full Text

161. Russell S, Foulkes I: **Embedding a positive research culture that fosters innovation.** *Nat. Rev. Cancer.* 2019; **19**(5): 241–242.
PubMed Abstract | Publisher Full Text

162. Allen C, Mehler DMA: **Open science challenges, benefits and tips in early career and beyond.** *PLoS Biol.* 2019; **17**(5).
Publisher Full Text

163. Anon.: **Not all scientists are raised equal. Nature.** *Astronomy.* 2017; **1**(6): 0167.
Publisher Full Text

164. Ballesteros-Rodríguez JL, De Saá-Pérez P, García-Carbonell N, *et al.*: **The influence of team members' motivation and leaders' behaviour on scientific knowledge sharing in universities.**

Int. Rev. Adm. Sci. 2022; **88**(2): 320–336.
Publisher Full Text

165. Fusulier B, Barbier P, Dubois-Shaik F: **"Navigating" through a scientific career: A question of private and professional configurational supports.** *Eur. Educ. Res. J.* 2017; **16**(2-3): 352–372.
Publisher Full Text

166. Hinton A Jr, Lambert WM: **Moving diversity, equity, and inclusion from opinion to evidence.** *Cell Rep Med.* 2022; **3**(4): 100619.
PubMed Abstract | Publisher Full Text | Free Full Text

167. Khalid S, Tadesse E: **Faculty research productivity at women's universities through the lens of preference theory.** *High. Educ.* 2022; **83**(5): 949–968.
Publisher Full Text

168. Hernandez R, Hoffmann-Longtin K, Patrick S, *et al.*: **The Conscientious Use of Images Illustrating Diversity in Medical Education Marketing.** *Acad. Med.* 2020; **95**(12): 1807–1810.
PubMed Abstract | Publisher Full Text

169. Hagan AK, Topçuoğlu BD, Gregory ME, *et al.*: **Women are underrepresented and receive differential outcomes at asm journals: A six-year retrospective analysis.** *MBio.* 2020; **11**(6): 1–21.
Publisher Full Text

170. Madzima TF, MacIntosh GC: **Equity, diversity, and inclusion efforts in professional societies: intention versus reaction.** *Plant Cell.* 2021; **33**(10): 3189–3193.
PubMed Abstract | Publisher Full Text | Free Full Text

171. Marshall A, Pack AD, Owusu SA, *et al.*: **Responding and navigating racialized microaggressions in STEM.** *Pathog Dis.* 2021; **79**(5).
PubMed Abstract | Publisher Full Text | Free Full Text

172. Martinez LR, Boucaud DW, Casadevall A, *et al.*: **Factors contributing to the success of NIH-designated underrepresented minorities in academic and nonacademic research positions.** *CBE Life Sci. Educ.* 2018; **17**(2): ar32.
PubMed Abstract | Publisher Full Text | Free Full Text

173. McGill BM, Foster MJ, Pruitt AN, *et al.*: **You are welcome here: A practical guide to diversity, equity, and inclusion for undergraduates embarking on an ecological research experience.** *Ecol. Evol.* 2021; **11**(8): 3636–3645.
PubMed Abstract | Publisher Full Text | Free Full Text

174. Mousa M: **Academia is racist: Barriers women faculty face in academic public contexts.** *Higer Educ Q.* 2021; **76**: 741–758.
Publisher Full Text

175. Prasad A: **Why are there still so few black scientists in the UK?** *The Observer (London).* 2021 10/04/2021.

176. Simpson JS, Giwa S, Denis VS: **In times of racial injustice, university education should not be 'neutral'.** *The Conversation.* 2021.
Reference Source

177. Smith-Carrier TA, Benbow S, Lawlor A, *et al.*: **"My only solution is to work later and sleep less": exploring the perspectives of parenting in academia in Ontario, Canada.** *Equal Diversity Incl.* 2021; **40**(8): 930–946.
Publisher Full Text

178. Zambas SI, Dutch S, Gerrard D: **Factors influencing Maori student nurse retention and success: An integrative literature review.** *Nurse Educ. Today.* 2020; **91**: 104477.
Publisher Full Text

179. Zhuwao S, Ngirande H, Ndlovu W, *et al.*: **Gender diversity, ethnic diversity and employee performance in a South African higher education institution.** *SA J. Hum. Resour. Manag.* 2019; **17**: 17.
Publisher Full Text

180. Foxx AJ, Meléndez KPF, Hariharan J, *et al.*: **Advancing equity and inclusion in microbiome research and training.** *mSystems.* 2021; **6**(5): e0115121.
PubMed Abstract | Publisher Full Text | Free Full Text

181. Etzkorn KB, Braddock A: **Are you my mentor? A study of faculty mentoring relationships in US higher education and the implications for tenure.** *Int. J. Mentor. Coach. Educ.* 2020; **9**(3): 221–237.
Publisher Full Text

182. Mathieson C: 2017.
Reference Source

183. Callwood KAA, Weiss M, Hendricks R, *et al.*: **Acknowledging and Supplanting White Supremacy Culture in Science Communication and STEM: The Role of Science Communication Trainers.** *Front. commun.* 2022; **7**: 7.
Publisher Full Text

184. Culpepper D, Reed AM, Enekwe B, *et al.*: **A New Effort to Diversify Faculty: Postdoc-to-Tenure Track Conversion Models.** *Front. Psychol.* 2021; **12**.
PubMed Abstract | Publisher Full Text | Free Full Text

185. Grahe JE, Cuccolo K, Leighton DC, *et al.*: **Open Science Promotes Diverse, Just, and Sustainable Research and Educational Outcomes.** *Psychol. Learn. Teach.* 2020; **19**(1): 5–20.
Publisher Full Text

186. Gutierrez-Wu J, Lawrence C, Jamison S, *et al.*: **An evaluation of programs designed to increase representation of diverse faculty at academic medical centers.** *J. Natl. Med. Assoc.* 2022; **114**: 278–289.
PubMed Abstract | Publisher Full Text

187. Hagan AK, Pollet RM, Libertucci J: **Suggestions for improving invited speaker diversity to reflect trainee diversity.** *J Microbiol Biol Educ.* 2020; **21**(1).
PubMed Abstract | Publisher Full Text | Free Full Text

188. Hoy KE, Fitzgibbon BM, Brem AK: **Lessons from an initiative to address gender bias.** *elife.* 2021; **10**(12): 15.
Publisher Full Text

189. Anon: **Slate that disputes command of USP proposes body to take care of inclusion and diversity.** *CE Noticias Financieras English.* 2021. 06/10/2021.

190. Batty D, Davis N: **Why science breeds a culture of sexism. The Guardian.** 2018.
Reference Source

191. Binns C: **How to make universities more inclusive? Hire more working-class academics.** *The Conversation.* 2020.
Reference Source

192. Lambert WM, Wells MT, Cipriano MF, *et al.*: **Research culture: Career choices of underrepresented and female postdocs in the biomedical sciences.** *elife.* 2020; **9**: 9.
Publisher Full Text

193. Lee A: **Toward a conceptual model of hierarchical microaggression in higher education settings: a literature review.** *Educ. Rev.* 2022; **74**(2): 321–352.
Publisher Full Text

194. Leišytė L, Deem R, Tzanakou C: **Inclusive universities in a globalized world.** *Soc. Incl.* 2021; **9**(3): 1–5.
Publisher Full Text

195. Mehta D, Bediako Y, de Winde CM, *et al.*: **Ways to increase equity, diversity and inclusion.** *elife.* 2020; **9**(07): 07.
Publisher Full Text

196. O'Meara K, Nyunt G, Templeton L, *et al.*: **Meeting to transgress The role of faculty learning communities in shaping more inclusive organizational cultures.** *Equal. Divers. Incl.* 2019; **38**(3): 286–304.
Publisher Full Text

197. Picardi I: **The glass door of academia: Unveiling new gendered bias in academic recruitment.** *Soc. Sci.* 2019; **8**(5).
Publisher Full Text

198. Frketich J: **McMaster vows to increase diversity among researchers.** *The Hamilton Spectator (Ontario, Canada).* 2019 31/05/2019.

199. Law SF, Croucher G: **Most of Australia's uni leaders are white, male and grey. This lack of diversity could be a handicap.** *The Conversation.* 2020.
Reference Source

200. McIntyre A: **Vice-chancellor marks one year at Leeds Trinity.** *Ilkley Gazette.* 2021 02/11/2021.

201. Stack M: **Why I'm not surprised Nobel Laureate Donna Strickland isn't a full professor.** *The Conversation.* 2018.
Reference Source

202. Woolston: **Satisfaction in science Nature.** 2018; **562**(7728): 611–614.

203. Farrugia G, Zorn CK, Williams AW, *et al.*: **A Qualitative Analysis of Career Advice Given to Women Leaders in an Academic Medical Center.** *JAMA Netw. Open.* 2020; **3**(7): e2011292.
PubMed Abstract | Publisher Full Text | Free Full Text

204. Linková M: **Academic excellence and gender bias in the practices and perceptions of scientists in leadership and decision-making positions.** *Gend Vyzk/Gend Res.* 2017; **18**(1): 42–66.
Publisher Full Text

205. Noble CE, Amey MJ, Colon LA, *et al.*: **Building a Networked Improvement Community: Lessons in Organizing to Promote Diversity, Equity, and Inclusion in Science, Technology, Engineering, and Mathematics.** *Front. Psychol.* 2021; **12**.
PubMed Abstract | Publisher Full Text | Free Full Text

206. Schipull EM, Quichocho XR, Close EW, editors. **"Success Together": Physics departmental practices supporting LGBTQ plus women and women of color.** *Physics Education Research (PER) Conference; 2019 2019 Jul 24-25; Provo, UT.* 2019.

207. Vega BE: **"What Is the Real Belief on Campus?" Perceptions of Racial Conflict at a Minority-Serving Institution and a**

Historically White Institution. *Teach. Coll. Rec.* 2021; **123**(9): 144–170.
Publisher Full Text

208. Huang CKK, Wilson K, Neylon C, *et al.*: **Mapping open knowledge institutions: an exploratory analysis of Australian universities.** *PeerJ.* 2021; **9**: e11391.
Publisher Full Text

209. Susi T, Shalvi S, Srinivas M: **'I'll work on it over the weekend': high workload and other pressures faced by early-career researchers.** *Nature.* 2019.
Publisher Full Text

210. Akbar A, Picard M: **Academic integrity in the Muslim world: a conceptual map of challenges of culture.** *Int. J. Educ. Integr.* 2020; **16**(1).
Publisher Full Text

211. Page T, Bull A, Chapman E: **Making Power Visible: "Slow Activism" to Address Staff Sexual Misconduct in Higher Education.** *Violence Against Women.* 2019; **25**(11): 1309–1330.
PubMed Abstract | Publisher Full Text

212. Cresiski RH, Ghent CA, Rutledge JC, *et al.*: **Developing a State University System Model to Diversify Faculty in the Biomedical Sciences.** *Front. Psychol.* 2022; **13**.
PubMed Abstract | Publisher Full Text | Free Full Text

213. Correa Vera YE, Montoya Monsalve JN, editors. **Women's Access to Research: Mexico.** *International Conference on Gender Research (ICGR); 2018 2018 Apr 12-13; ISCAP, P Porto, Porto, PORTUGAL.* 2018.

214. Chapman A: **Using the assessment process to overcome Imposter Syndrome in mature students.** *J. Furth. High. Educ.* 2017; **41**(2): 112–119.
Publisher Full Text

215. Lee JE, Sung JH, Sarpong D, *et al.*: **Knowledge Management for Fostering Biostatistical Collaboration within a Research Network: The RTRN Case Study.** *Int. J. Environ. Res. Public Health.* 2018; **15**(11): 12.

216. Fox N: **142 Open Science: Improving Access and Reducing Bias in Science.** *J. Anim. Sci.* 2021; **99**: 75–76.
Publisher Full Text

217. Campbell-Whatley G, O'Brien C, Reddig K, *et al.*: **Non-majority student perceptions of diversity and inclusion at a PWI and an HBCU.** *J. Multicult. Educ.* 2021; **15**(3): 253–269.
Publisher Full Text

218. Lundwall RA: **Changing institutional incentives to foster sound scientific practices: One department.** *Infant Behav. Dev.* 2019; **55**: 69–76.
PubMed Abstract | Publisher Full Text

219. Sotomayor-Beltran C, Zarate Segura GW: **Peruvian Scientific Production Affected by Predatory Journals.** *Int. Inf. Libr. Rev.* 2022; **54**(1): 32–38.
Publisher Full Text

220. Bothwell E: **US research culture stuck in past, says cancer expert.** *The Times Higher Education Supplement.* 2017 08/07/2017.

221. Abeysiriwardana PC, Jayasinghe-Mudalige UK: **Role of key performance indicators on agile transformation of performance management in research institutes towards innovative commercial agriculture.** *J. Sci. Technol. Policy Manage.* 2021; **13**: 213–243.
Publisher Full Text

222. Adefuye AO, Coetzee L, Janse van Vuuren C, *et al.*: **Medical Educators' Perceptions of Research Culture in a Faculty of Health Sciences: A South African Study.** *Teach. Learn. Med.* 2021; **33**(5): 509–524.
PubMed Abstract | Publisher Full Text

223. Franzen SRP, Chandler C, Lang T: **Health research capacity development in low and middle income countries: Reality or rhetoric? A systematic meta-narrative review of the qualitative literature.** *BMJ Open.* 2017; **7**(1): e012332.
PubMed Abstract | Publisher Full Text | Free Full Text

224. Hoffmann K, Berg S, Koufogiannakis D: **Understanding factors that encourage research productivity for academic librarians.** *Evid. Based Libr. Inf. Pract.* 2017; **12**(4): 102–128.
Publisher Full Text

225. Köse MF, Korkmaz M: **Why are some universities better? An evaluation in terms of organizational culture and academic performance.** *High. Educ. Res. Dev.* 2019; **38**(6): 1213–1226.
Publisher Full Text

226. Luqman MS, Rehman JU, Islam ZU, *et al.*: **Effect of organizational climate upon the job performance of instructors' physical education.** *Pedagogy Phys. Cult. Sports.* 2020; **24**(2): 72–76.
Publisher Full Text

227. Mbeo MA, Rambe P, editors. **Managing academic resistance to research of academics at a university of technology.** *15th International Conference on Intellectual Capital, Knowledge Management and Organisational Learning, ICICKM 2018; Academic Conferences and Publishing International Limited.* 2018.

228. Olesen AP, Amin L, Mahadi Z: **Malaysian researchers talk about the influence of culture on research misconduct in higher learning institutions.** *Accountability in Research-Policies and Quality Assurance.* 2017; **24**(8): 469–482.
Publisher Full Text

229. Papatsiba V, Cohen E: **Institutional hierarchies and research impact: new academic currencies, capital and position-taking in UK higher education.** *Br. J. Sociol. Educ.* 2020; **41**(2): 178–196.
Publisher Full Text

230. Saplan DMM: **An innovation to heighten research culture in selected colleges of nursing in Region IX, Philippines.** *Int. J. Innov. Creat Change.* 2020; **12**(6): 307–322.

231. Shen W, Jiang J: **Institutional prestige, academic supervision and research productivity of international PhD students: Evidence from Chinese returnees.** *J. Sociol.* 2021; **59**: 552–579.
Publisher Full Text

232. Suson RL, Capuno R, Manalastas R, *et al.*: **Educational research productivity road map: Conclusions from the identified research barriers and variables.** *Cypriot J. Educ. Sci.* 2020; **15**(5): 1160–1175.
Publisher Full Text

233. Vachon B, Curran JA, Karunananthan S, *et al.*: **Changing research culture toward more use of replication research: a narrative review of barriers and strategies.** *J. Clin. Epidemiol.* 2021; **129**: 21–30.
PubMed Abstract | Publisher Full Text

234. Vuong QH, Napier NK, Ho TM, *et al.*: **Effects of work environment and collaboration on research productivity in Vietnamese social sciences: evidence from 2008 to 2017 scopus data.** *Stud. High. Educ.* 2019; **44**(12): 2132–2147.
Publisher Full Text

235. Matthews D: **Research funders urge caution over demanding 'excellence'.** *The Times Higher Education Supplement.* 2020 23/07/2020.

236. Warren C: **'Professors eat their own young': how competition can stifle good science.** *The Guardian.* 2018.

237. Bishop DVM: **The psychology of experimental psychologists: Overcoming cognitive constraints to improve research: The 47th Sir Frederic Bartlett Lecture.** *Q. J. Exp. Psychol.* 2020; **73**(1): 1–19.
PubMed Abstract | Publisher Full Text | Free Full Text

238. Chandler N, Heidrich B, Kasa R: **Everything changes? A repeated cross-sectional study of organisational culture in the public sector.** *Evidence-Based Hrm-a Global Forum for Empirical Scholarship.* 2017; **5**(3): 283–296.
Publisher Full Text

239. Henry C, Md Ghani NA, Hamid UMA, *et al.*: **Factors contributing towards research productivity in higher education.** *Int. J. Eval. Res. Educ.* 2020; **9**(1): 203–211.
Publisher Full Text

240. Waters AM, LeBeau RT, Young KS, *et al.*: **Towards the enhancement of quality publication practices in clinical psychological science.** *Behav. Res. Ther.* 2020; **124**: 103499.
PubMed Abstract | Publisher Full Text

241. Heuritsch J: **Towards a democratic university: A call for reflexive evaluation and a participative culture.** 2021b.

242. Kouper I, Raymond AH, Giroux S: **An Exploratory Study of Research Data Governance in the U.S.** *Open Inf. Sci.* 2020; **4**(1): 122–142.

243. Ajjawi R, Crampton PES, Rees CE: **What really matters for successful research environments? A realist synthesis.** *Med. Educ.* 2018; **52**(9): 936–950.
PubMed Abstract | Publisher Full Text | Free Full Text

244. Chuanfu C, Qiushi L: **Library Development in an Open Society.** *J. Lib. Sci. China.* 2020; **46**(1): 16–37.

245. Sarabipour S: **Virtual conferences raise standards for accessibility and interactions.** *elife.* 2020; **9**(11): 04.
Publisher Full Text

246. Adetayo AJ: **The Nexus of Social Media Use and Research Productivity of Lecturers in Private Universities in Ogun State, Nigeria.** *Libr. Philos. Pract.* 2021; **2021**: 1–14.

247. Causadias JM, Korous KM, Cahill KM, *et al.*: **The Importance of Research About Research on Culture: A Call for Meta-research on Culture.** *Cult. Divers. Ethn. Minor. Psychol.* 2021.

248. Palotie P, Nurkka P, Juvonen S, editors. **The quality matters - the experiences of a project manager training 10th Annual International Conference of Education, Research and Innovation (ICERI); 2017 2017 Nov 16-18; Seville, SPAIN.** 2017.

249. Varma S: **Why learn business ethics?-Students' conceptions of the use and exchange value of applied business ethics.**

Asian J. Bus. Ethics. 2019; **8**(1): 107–125.
Publisher Full Text

250. Crewe R, Gevers W: **How to approach the revolution in scholarly publishing.** *The Conversation.* 2019.
Reference Source

251. Curry S: **It's time for academics to take back control of research journals.** *The Guardian.* 2017.

252. Fyfe A, Coate K, Curry S: **Untangling academic publishing: A history of the relationship between commercial interests, academic prestige and the circulation of research.** *Zendo.* 2017.

253. Heuritsch J: **Reflexive Behaviour: How publication pressure affects research quality in Astronomy.** 2021.

254. Kirchherr J: **Why we can't trust academic journals to tell the scientific truth.** *The Guardian.* 2017.

255. Leyser O, Kingsley D, Grange J: **The science 'reproducibility crisis' – and what can be done about it.** *The Conversation.* 2017.
Reference Source

256. Heng K, Hamid MO, Khan A: **Factors influencing academics' research engagement and productivity: A developing countries perspective.** *Issues Educ. Res.* 2020; **30**(3): 965–987.

257. Gonzalez-Diaz R, Acevedo-Duque Á, Martin-Fiorino V, *et al.*: **Latin American professors' research culture in the digital age.** *Comunicar.* 2022; **30**(70): 71–83.
Publisher Full Text

258. Lourdes ESL, Frontera WR, Huertas A: **4143 HiREC Endowment: Building Models in Research Capacity for Infrastructure Sustainability and Productivity.** *J. Clin. Transl. Sci.* 2020; **4**(s1): 62–63.
Publisher Full Text

259. Roesdiono E, Saptandari PEP, Suminar DR: **Employee retention at 'Precious' English language course in Surabaya.** *Masyarakat Kebudayaan Dan Politik.* 2019; **32**(1): 95–104.
Publisher Full Text

260. Robson SG, Baum MA, Beaudry JL, *et al.*: **Promoting open science: A holistic approach to changing behaviour.** *Collabra Phychol.* 2021; **7**(1).
Publisher Full Text

261. Munafò MR, Chambers C, Collins A, *et al.*: **The reproducibility debate is an opportunity, not a crisis.** *BMC. Res. Notes.* 2022; **15**(1): 43.
PubMed Abstract | Publisher Full Text | Free Full Text

262. Anon.: **Psychology accused of 'collective self-deception' over results.** *The Times Higher Educations Supplement.* 2019 12/12/2019.

263. Dominik M, Nzweundji JG, Ahmed N, *et al.*: **Open Science-For Whom?** *Data Sci. J.* 2022; **21**(1).
Publisher Full Text

264. Edelmann N, Schoßböck J: **Open access perceptions, strategies, and digital literacies: A case study of a scholarly-led journal.** *Publ.* 2020; **8**(3).
Publisher Full Text

265. Garcia-Guerrero M, Ramirez-Montoya MS, Garcia-Penalvo FJ, editors. **Towards an Open Science technological ecosystem for a Mexican University.** *8th International Conference on Technological Ecosystems for Enhancing Multiculturality, TEEM 2020, October 21, 2020 - October 23, 2020; 2020; Virtual, Online, Spain: Association for Computing Machinery.*

266. Gold ER, Ali-Khan SE, Allen L, *et al.*: **An open toolkit for tracking open science partnership implementation and impact [version 2; peer review: 2 approved].** *Gates Open Res.* 2019; **3**: 1442.
PubMed Abstract | Publisher Full Text | Free Full Text

267. Hammatt Z: **Spotlight on research integrity: international insights on strengthening research culture in the forensic sciences and beyond.** *Forensic Sci. Res.* 2021; **6**(4): 281–282.
PubMed Abstract | Publisher Full Text | Free Full Text

268. Hatch A, Curry S: **Changing how we evaluate research is difficult, but not impossible.** *elife.* 2020; **9**(08): 12.
Publisher Full Text

269. Koroshetz WJ, Behrman S, Brame CJ, *et al.*: **Framework for advancing rigorous research.** *elife.* 2020; **9**: 9.
Publisher Full Text

270. Koterwas A, Dwojak-Matras A, Kalinowska K: **Dialogical teaching of research integrity: an overview of selected methods.** *Facet.* 2021; **6**: 2138–2154.
Publisher Full Text

271. Ma L: **Money, morale, and motivation: A study of the Output-Based Research Support Scheme in University College Dublin.** *Res. Eval.* 2019; **28**(4): 304–312.
Publisher Full Text

272. Marques M, Powell JJW, Zapp M, *et al.*: **How does research evaluation impact educational research? Exploring intended and unintended consequences of research assessment in the United Kingdom, 1986–2014.** *Eur. Educ. Res. J.* 2017; **16**(6): 820–842.
Publisher Full Text

273. Mebane CA, Sumpter JP, Fairbrother A, *et al.*: **Scientific integrity issues in Environmental Toxicology and Chemistry: Improving research reproducibility, credibility, and transparency.** *Integr. Environ. Assess. Manag.* 2019; **15**(3): 320–344.
PubMed Abstract | Publisher Full Text | Free Full Text

274. Severin A, Egger M, Eve MP, *et al.*: **Discipline-specific open access publishing practices and barriers to change: an evidence-based review.** *F1000Res.* 2018; **7**: 1925.
Publisher Full Text

275. Stracke CM: **Open Science and Radical Solutions for Diversity, Equity and Quality in Research: A Literature Review of Different Research Schools, Philosophies and Frameworks and Their Potential Impact on Science and Education.** Lecture Notes in Educational Technology: Springer. 2020; pp. 17–37.

276. Tecwyn EC: **Doing reliable research in comparative psychology: Challenges and proposals for improvement.** *J. Comp. Psychol.* 2021; **135**(3): 291–301.
PubMed Abstract | Publisher Full Text

277. Williams M, Mullane K, Curtis MJ: **Addressing Reproducibility: Peer Review, Impact Factors, Checklists, Guidelines, and Reproducibility Initiatives.** *Research in the Biomedical Sciences: Transparent and Reproducible: Elsevier.* 2018; 197–306.
Publisher Full Text

278. Woolston C: **Australian junior scientists report damaging lack of support at work.** *Nature.* 2020; **579**: 457–458.
PubMed Abstract | Publisher Full Text

279. Abbott LE, Andes A, Pattani AC, *et al.*: **Authorship Not Taught and Not Caught in Undergraduate Research Experiences at a Research University.** *Sci. Eng. Ethics.* 2020; **26**(5): 2555–2599.
PubMed Abstract | Publisher Full Text

280. Baker S: **Managers who 'fetishise' certain journals warp incentive culture.** *The Times Higher Education Supplement.* 2019 14/11/2019.

281. Banks GC, Field JG, Oswald FL, *et al.*: **Answers to 18 Questions About Open Science Practices.** *J. Bus. Psychol.* 2019; **34**(3): 257–270.
Publisher Full Text

282. Baskin P: **Top-tier US universities push for open science. Times.** *High. Educ.* 2022 20/04/2022.

283. Bonn NA, Pinxten W: **Rethinking success, integrity, and culture in research (part 2) - a multi-actor qualitative study on problems of science.** *Research Integrity and Peer Review.* 2021; **6**(1).
Publisher Full Text

284. Bornmann L, Guns R, Thelwall M, *et al.*: **Which aspects of the open science agenda are most relevant to scientometric research and publishing? An opinion paper.** *Quantitative Sci Stud.* 2021; **2**(2): 438–453.
Publisher Full Text

285. Center for Open Science: *Effort to repeat key cancer biology experiments reveals challenges and opportunities to improve replicability.* The Breeze: James Madison University; 2021 07/12/2021.

286. Gersten P: *EPA Transparency Rule Will Bolster Science and Improve Rulemaking.* Competitive Enterprise Institute; 2018 16/07/2018.

287. Miguel E: **Evidence on research transparency in economics.** *J. Econ. Perspect.* 2021; **35**(3): 193–214.
Publisher Full Text

288. Mullard A: **Half of top cancer studies fail high-profile reproducibility effort.** *Nature.* 2021; **600**: 368–369.
PubMed Abstract | Publisher Full Text

289. Stall S, Yarmey L, Cutcher-Gershenfeld J, *et al.*: **Make scientific data FAIR.** *Nature.* 2019; **570**: 27–29.
Publisher Full Text

290. Tegbaru D, Braverman L, Zietman AL, *et al.*: **ASTRO Journals' Data Sharing Policy and Recommended Best Practices.** *Adv. Radiat. Oncol.* 2019; **4**(4): 551–558.
PubMed Abstract | Publisher Full Text | Free Full Text

291. Zuiderwijk A, Shinde R, Jeng W: **What drives and inhibits researchers to share and use open research data? A systematic literature review to analyze factors influencing open research data adoption.** *PLoS One.* 2020; **15**(9 September): e0239283.
PubMed Abstract | Publisher Full Text | Free Full Text

292. Cumyn A, Ouellet K, Côté AM, *et al.*: **Role of Researchers in the Ethical Conduct of Research: A Discourse Analysis From Different Stakeholder Perspectives.** *Ethics Behav.* 2019; **29**(8): 621–636.
Publisher Full Text

293. Feng GC: **Research Performance Evaluation in China: A Big Data Analysis.** *SAGE Open.* 2020; **10**(1): 215824401990125.
Publisher Full Text

294. Labib K, Roje R, Bouter L, *et al.*: **Important Topics for Fostering Research Integrity by Research Performing and Research Funding Organizations: A Delphi Consensus Study.** *Sci. Eng. Ethics.* 2021; **27**(4): 47.
PubMed Abstract | Publisher Full Text | Free Full Text

295. Martin-Sardesai A, Guthrie J, Tooley S, *et al.*: **History of research performance measurement systems in the Australian higher education sector.** *Account. Hist.* 2019; **24**(1): 40–61.
Publisher Full Text

296. Suls J, Rothman AJ, Davidson KW: **Now Is the Time to Assess the Effects of Open Science Practices With Randomized Control Trials.** *Am. Psychol.* 2021; 1–9.

297. Flake JK: **Strengthening the foundation of educational psychology by integrating construct validation into open science reform.** *Educ. Psychol.* 2021; **56**(2): 132–141.
Publisher Full Text

298. Holst MR, Faust A, Strech D: **Do German university medical centres promote robust and transparent research? A cross-sectional study of institutional policies.** *Health Res. Policy Syst.* 2022; **20**(1): 39.
PubMed Abstract | Publisher Full Text | Free Full Text

299. Horn L: **Promoting Responsible Research Conduct: A South African Perspective.** *J. Acad. Ethics.* 2017; **15**(1): 59–72.
Publisher Full Text

300. Moher D, Naudet F, Cristea IA, *et al.*: **Assessing scientists for hiring, promotion, and tenure.** *PLoS Biol.* 2018; **16**(3): e2004089.
PubMed Abstract | Publisher Full Text | Free Full Text

301. Paxton A, Tullett A: **Open Science in Data-Intensive Psychology and Cognitive Science.** *Policy Insights Behav. Brain Sci.* 2019; **6**(1): 47–55.
Publisher Full Text

302. Satalkar P, Perneger T, Shaw D: **Accommodating an Uninvited Guest: Perspectives of Researchers in Switzerland on 'Honorary' Authorship.** *Sci. Eng. Ethics.* 2020; **26**(2): 947–967.
PubMed Abstract | Publisher Full Text

303. Ščepanović R, Labib K, Buljan I, *et al.*: **Practices for Research Integrity Promotion in Research Performing Organisations and Research Funding Organisations: A Scoping Review.** *Sci. Eng. Ethics.* 2021; **27**(1): 4.
PubMed Abstract | Publisher Full Text | Free Full Text

304. Schmidt R, Curry S, Hatch A: **Creating SPACE to evolve academic assessment.** *elife.* 2021; **10**(09): 23.

305. Schroter S, Montagni I, Loder E, *et al.*: **Awareness, usage and perceptions of authorship guidelines: An international survey of biomedical authors.** *BMJ Open.* 2020; **10**(9): e036899.
PubMed Abstract | Publisher Full Text | Free Full Text

306. Stremersch S, Winer RS, Camacho N: **Faculty Research Incentives and Business School Health: A New Perspective from and for Marketing.** *J. Mark.* 2021; **85**(5): 1–21.
Publisher Full Text

307. Li D, Li Y: **Masked Resistance in Neoliberal Academia: Academics' Responses to the Research Assessment Exercise 2020 in Hong Kong.** *High Educ. Pol.* 2021; **36**: 270–288.
Publisher Full Text

308. Chubb J, Cowling P, Reed D: **Speeding up to keep up: exploring the use of AI in the research process.** *AI Soc.* 2021; **37**: 1439–1457.
Publisher Full Text

309. Curtis GJ, Slade C, Bretag T, *et al.*: **Developing and evaluating nationwide expert-delivered academic integrity workshops for the higher education sector in Australia.** *High. Educ. Res. Dev.* 2021; **41**: 665–680.
Publisher Full Text

310. Fussy DS: **The hurdles to fostering research in Tanzanian universities.** *High. Educ.* 2019; **77**(2): 283–299.
Publisher Full Text

311. Helgesson G, Bülow W: **Research Integrity and Hidden Value Conflicts.** *J. Acad. Ethics.* 2021; **21**: 113–123.
Publisher Full Text

312. Munafò MR, Nosek BA, Bishop DVM, *et al.*: **A manifesto for reproducible science.** *Nat. Hum. Behav.* 2017; **1**(1).
Publisher Full Text

313. Aleman-Juarez A, Becerra-Mariscal AE, Garcia-Higuera MC, editors. **Revista de intergridad academica: An effort to foster academic integrity in Universidad Panamericana 10th International Conference on Education and New Learning Technologies (EDULEARN); 2018 2018 Jul 02-04; Palma, SPAIN.** 2018.

314. Antes AL, Kuykendall A, DuBois JM: **The lab management practices of "Research Exemplars" that foster research rigor and regulatory compliance: A qualitative study of successful principal investigators.** *PLoS One.* 2019; **14**(4): e0214595.
PubMed Abstract | Publisher Full Text | Free Full Text

315. Brunt MW, Weary DM: **Perceptions of laboratory animal facility managers regarding institutional transparency.** *PLoS One.* 2021; **16**(7): e0254279.
PubMed Abstract | Publisher Full Text | Free Full Text

316. Elliott KC, Resnik DB: **Making open science work for science and society.** *Environ. Health Perspect.* 2019; **127**(7): 75002.
PubMed Abstract | Publisher Full Text | Free Full Text

317. Gallagher RV, Falster DS, Maitner BS, *et al.*: **Open Science principles for accelerating trait-based science across the Tree of Life.** *Nat. Ecol. Evol.* 2020; **4**(3): 294–303.
PubMed Abstract | Publisher Full Text

318. Kraft-Todd GT, Rand DG: **Practice what you preach: Credibility-enhancing displays and the growth of open science.** *Organ. Behav. Hum. Decis. Process.* 2021; **164**: 1–10.
Publisher Full Text

319. Mullane K, Curtis MJ, Williams M: *Biomedical Research in the 21st Century: Multiple Challenges in Resolving Reproducibility Issues. Research in the Biomedical Sciences: Transparent and Reproducible.* Elsevier; 2018; 307–353.

320. Ofori G: **Professionalism in built environment research: beyond integrity and good practice.** *Eng. Constr. Archit. Manag.* 2021; **29**: 3617–3646.
Publisher Full Text

321. Roche DG, O'Dea RE, Kerr KA, *et al.*: **Closing the knowledge-action gap in conservation with open science.** *Conserv. Biol.* 2021; **36**.
Publisher Full Text

322. Roje R, Tomić V, Buljan I, *et al.*: **Development and implementation of research integrity guidance documents: Explorative interviews with research integrity experts.** *Account. Res.* 2021; **30**: 293–330.
Publisher Full Text

323. Satalkar P, Shaw D: **How do researchers acquire and develop notions of research integrity? A qualitative study among biomedical researchers in Switzerland.** *BMC Med. Ethics.* 2019; **20**(1): 72.
PubMed Abstract | Publisher Full Text | Free Full Text

324. Tang L, Cao C, Lien D, *et al.*: **The Effects of Anti-corruption Campaign on Research Grant Reimbursement: Regression Discontinuity Evidence from China.** *Sci. Eng. Ethics.* 2020; **26**(6): 3415–3436.
PubMed Abstract | Publisher Full Text

325. Tijdink JK, Horbach SPJM, Nuijten MB, *et al.*: **Towards a Research Agenda for Promoting Responsible Research Practices.** *J. Empir. Res. Hum. Res. Ethics.* 2021; **16**(4): 450–460.
PubMed Abstract | Publisher Full Text | Free Full Text

326. Cervini E: **Transparency key to cutting dodgy research: Dutch expert.** *The Australian.* 2018 06/06/2018.

327. Fidler F, Fraser H: **Our survey found 'questionable research practices' by ecologists and biologists – here's what that means.** *The Conversation.* 2018.
Reference Source

328. Macleod M: **Want research integrity? Stop the blame game.** *Nature.* 2021; **599**: 533.
PubMed Abstract | Publisher Full Text

329. Munafò M: **Raising research quality will require collective action.** *Nature.* 2019; **576**: 183.
PubMed Abstract | Publisher Full Text

330. Valkenburg G, Dix G, Tijdink J, *et al.*: **Expanding Research Integrity: A Cultural-Practice Perspective.** *Sci. Eng. Ethics.* 2021; **27**(1): 10.
PubMed Abstract | Publisher Full Text | Free Full Text

331. Zwart H, Ruud ter M: **Addressing research integrity challenges: from penalising individual perpetrators to fostering research ecosystem quality care.** *Life Sci. Soc. Policy.* 2019; **15**(1): 1–5.
Publisher Full Text

332. Feinberg M, Sutherland W, Nelson SB, *et al.*: **The New Reality of Reproducibility: The Role of Data Work in Scientific Research.** *Proc ACM Hum Comput Interact.* 2020; **4**(CSCW1): 1–22.
Publisher Full Text

333. Gilmore RO, Diaz MT, Wyble BA, *et al.*: *Progress toward openness, transparency, and reproducibility in cognitive neuroscience. Annals of the New York Academy of Sciences.* Blackwell Publishing Inc.; 2017; pp. 5–18.

334. Gurgu E, Tonis RB-M, Avram LG, *et al.*: **Applicability of the ethics management tools in Romanian academia.** *Indep. J. Manag. Prod.* 2020; **11**(7): 2709–2732.
Publisher Full Text

335. Leonelli S: **Global data quality assessment and the situated nature of "best" research practices in biology.** *Data Sci. J.* 2017; **16**.
Publisher Full Text

336. Mische SM, Fisher NC, Meyn SM, *et al.*: **A review of the scientific rigor, reproducibility, and transparency studies conducted by the ABRF research groups.** *J. Biomol. Tech.* 2020; **31**(1): 11–26.
PubMed Abstract | Publisher Full Text | Free Full Text

337. Moher D: **COVID-19 and the research scholarship ecosystem: help!** *J. Clin. Epidemiol.* 2021; **137**: 133–136.
PubMed Abstract | Publisher Full Text | Free Full Text

338. Rastogi S: **Making ASU ethics committees more productive: Responsible research needs more than developing the guidelines.** *J. Ayurveda Integr. Med.* 2021; **12**(1): 191–194.
PubMed Abstract | Publisher Full Text | Free Full Text

339. Rhaiem M, Amara N: **Determinants of research efficiency in Canadian business schools: evidence from scholar-level data.** *Scientometrics.* 2020; **125**(1): 53–99.
Publisher Full Text

340. Satalkar P, Shaw D: **Is failure to raise concerns about misconduct a breach of integrity? Researchers' reflections on reporting misconduct.** *Account. Res.* 2018; **25**(6): 311–339.
PubMed Abstract | Publisher Full Text

341. Spitschan M, Schmidt MH, Blume C: **Transparency And Open Science Principles In Reporting Guidelines In Sleep Research And Chronobiology Journals [Version 1; Peer Review: 3 Approved With Reservations].** *Wellcome Open Res.* 2020; **5**: 1–25.
Publisher Full Text

342. Stagge JH, Rosenberg DE, Abdallah AM, *et al.*: **Assessing data availability and research reproducibility in hydrology and water resources.** *Sci. Data.* 2019; **6**: 6.
Publisher Full Text

343. Christensen G, Freese J, Miguel E: *Transparent and reproducible social science research: How to do open science.* University of California Press; 2019; 1–272.

344. Woutersen-Windhouwer S, Rodríguez EM, Sondervan J, *et al.*: **Consolidating institutional repositories in a digital, free, open access publication platform for all scholarly output.** *LIBER Q.* 2020; **30**(1): 1–15.
Publisher Full Text

345. Zinchenko V, Ostapenko S, Udovichenko H: **Introduction of Academic Honesty as a Necessary Prerequisite and an Important Component of Quality Education for Future Economists.** *Revista Romaneasca Pentru Educatie Multidimensionala.* 2021; **13**(1): 81–95.
Publisher Full Text

346. Ansar, editor **Implementation of Total Quality Management in Higher Education (A Case of State University of Gorontalo, Indonesia).** *9th International Conference for Science Educators and Teachers (ICSET); 2017 2017 Sep 13-15; Indonesia.* 2017.

347. Chapman AL, Greenhow C: **Citizen-scholars: Social media and the changing nature of scholarship.** *Publ.* 2019; **7**(1).
Publisher Full Text

348. Dougherty MR, Slevc LR, Grand JA: **Making Research Evaluation More Transparent: Aligning Research Philosophy, Institutional Values, and Reporting.** *Perspect. Psychol. Sci.* 2019; **14**(3): 361–375.
PubMed Abstract | Publisher Full Text

349. Olsen J, Mosen J, Voracek M, *et al.*: **Research practices and statistical reporting quality in 250 economic psychology master's theses: a meta-research investigation.** *R. Soc. Open Sci.* 2019; **6**(12): 190738.
PubMed Abstract | Publisher Full Text | Free Full Text

350. Beugelsdijk S, van Witteloostuijn A, Meyer KE: **A new approach to data access and research transparency (DART).** *J. Int. Bus. Stud.* 2020; **51**(6): 887–905.
Publisher Full Text

351. Wingen T, Berkessel JB, Englich B: **No Replication, No Trust? How Low Replicability Influences Trust in Psychology.** *Soc. Psychol. Personal. Sci.* 2020; **11**(4): 454–463.
Publisher Full Text

352. Bhattacharya N, Langhout RD, Vaccarino-Ruiz SS, *et al.*: **"Being a team of five strong women horizontal ellipsis we had to make an impression:" The College Math Academy as an intervention into mathematics education.** *Am. J. Community Psychol.* 2021; **70**: 228–241.
Publisher Full Text

353. Blatch-Jones A, Lakin K, Thomas S: A scoping review on what constitutes a good research culture. (dat aset). *OSF.* 2024.

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This is a review of the peer-reviewed and grey literature on research culture issues at research institutions that aims to explore the evidence base for (i) claims of poor research culture, (ii) the benefits of a 'good' research culture, and (iii) what 'good' might might look like.

The review is systematic in its consideration of the literature published between 2017 and 2022 and certainly addresses an important and topical area. However, I have a number of concerns about the design and execution of the study.

First, the aims lack focus. As stated, they are to "explore the interplay between research culture, open research, career paths, recognition and rewards and EDI". This maps out an extremely broad range of issues and doesn't clearly articulate the desired endpoints.

A second concern is the fact that the literature surveyed is confined to a 5-year period that ended over two years ago. Given the topicality of the subject, I find this a strange limitation. What reassurance can the authors offer that their review is not already out of date?

Third, and perhaps most critically, the report is largely descriptive and lacks an analytical edge that I think would add considerably to the value and impact of the piece. I was left wondering who is going to read this and what will they take away? The main conclusion in the abstract is that research institutions and funders need to work together, a finding that seems obvious given the systemic nature of the issues under discussion. What is new here that we didn't know before the review was conducted?

I suspect the lack of analysis may reflect the fact that the interactions between open research, EDI etc and research culture are extremely difficult to isolate and distinguish and that there have been relatively few efforts to evaluate whether interventions have had positive or negative effects on research culture. The problem is made more difficult because of the existence of external influences (e.g. funder policies, league tables, international competition) on institutional culture. Nevertheless, even to highlight the absence of such evaluation efforts would be a valuable point

to make – and I hope that the authors might address this question in a revised version of the paper.

I have a few additional comments:

In the first paragraph of the introduction, I think it would be more appropriate to present the 'actions' that have been taken in chronological order.

Later in the introduction, it is stated that "attempts on reform requires commitment from everyone". While I agree with this claim, it sits oddly with the study design, which is focused only on research institutions. This is one of several instances where I lost sight of the coherence of the arguments being presented.

In the first paragraph of the section on Security and Career Progression, the authors identify "concerns over job security, career progression and sustainability…" but it is not clear to me what is meant by sustainability in this context.

Later in this section it is stated that "The evidence suggests that offering potential solutions or supportive actions for academic institutions and the research community may enhance and stabilise career paths, particularly those in the early career stage, including those in technical and managerial roles." This is a rather vague and weak statement. What solutions have been identified? Who is responsible for them and how effective are they? What does it mean to enhance a career path?

On page 19 it is stated (with regard to the replication crisis) that "Determining where effort is most needed and what changes are required, not only provides opportunity for the research ecosystem but also how RPOs and RFOs can mandate open research practices, and therefore coordinate change at both research integrity and researcher integrity level…". This is another rather vague claim where analysis is lacking. What specific changes might be made? Could the authors also address the very live debates around the merits and demerits of using mandates?

In the Discussion, the sentence "The increasing competitiveness within the research environment, with research funding organisations (RFOs) placing greater focus on impact rather than creativity and innovation, is causing a global initiative for cultural change" doesn't make sense to me. Is it not increasing awareness of the harmful impacts of research competition that is leading many stakeholders across the world to focus attention on improving research culture. This is just one example of what I find to be a rather fuzzy style of writing. This sense is compounded by the repetition of the phrase "the evidence suggests". As noted above, I would like to see the authors doing a better job of sifting and weighing the evidence.

The last paragraph of the Conclusions is not really a conclusion. It is to my mind a description of a situation that was evident before reading this review. The first paragraph begins with the statement that "The review has shown that there is a wealth of evidence suggesting how and where changes are needed to establish a global cultural change to the research ecosystem. " I think it would add a great deal of value to the review if the authors could identify what they think are the most important changes. This would have the potential to focus the attention of the sector on the most urgent actions to be undertaken.

Are the rationale for, and objectives of, the Systematic Review clearly stated?
No

Are sufficient details of the methods and analysis provided to allow replication by others?
Yes

Is the statistical analysis and its interpretation appropriate?
Not applicable

Are the conclusions drawn adequately supported by the results presented in the review?
Partly

If this is a Living Systematic Review, is the 'living' method appropriate and is the search schedule clearly defined and justified? ('Living Systematic Review' or a variation of this term should be included in the title.)
Not applicable

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Research assessment, EDI, metascience, structural biology

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 19 Aug 2024

Amanda Blatch-Jones

Unfortunately we did not receive your review until we submitted a revised version. We will of course address your comments in version 3, when we have received all of the reviewers comments. Thank you again for your comments and suggestions for improvements.

Competing Interests: No competing interests were disclosed.

Author Response 10 Sep 2024

Amanda Blatch-Jones

In addition to our previous comments we would like to add that we have addressed your comments in line with the other comments and feedback received. Thank you for your comments.

First, the aims lack focus. As stated, they are to "explore the interplay between research culture, open research, career paths, recognition and rewards and EDI". This maps out an extremely broad range of issues and doesn't clearly articulate the desired endpoints.
Thank you for your comment. The scoping review was kept broad for the purposes of

the review and the related areas highlighted in the Wellcome report. On this basis, we kept the review broad to capture relevant evidence (and contribute to the wider piece of work the review contributed to).

A second concern is the fact that the literature surveyed is confined to a 5-year period that ended over two years ago. Given the topicality of the subject, I find this a strange limitation. What reassurance can the authors offer that their review is not already out of date?
We appreciate your concern around the period; however, this was chosen to consider existing literature in the space, the Wellcome report and initiatives in research culture. The period covered relevant references and included reports of changes during COVID-19 pandemic. As this was a scoping review to determine the existing evidence, we were only covering the specified areas within that period.

Third, and perhaps most critically, the report is largely descriptive and lacks an analytical edge that I think would add considerably to the value and impact of the piece. I was left wondering who is going to read this and what will they take away? The main conclusion in the abstract is that research institutions and funders need to work together, a finding that seems obvious given the systemic nature of the issues under discussion. What is new here that we didn't know before the review was conducted?
The review provides updated literature from the Wellcome report and supports the existing evidence that although there are further developments in this space, there is still a lack of collaborative working. The statements provided in the tables gives greater clarity around what these developments are and how they could be considered to foster and incentivise what a good research culture looks like. As this was a scoping review, analytical content or assessment was out of scope.

I suspect the lack of analysis may reflect the fact that the interactions between open research, EDI etc and research culture are extremely difficult to isolate and distinguish and that there have been relatively few efforts to evaluate whether interventions have had positive or negative effects on research culture. The problem is made more difficult because of the existence of external influences (e.g. funder policies, league tables, international competition) on institutional culture. Nevertheless, even to highlight the absence of such evaluation efforts would be a valuable point to make – and I hope that the authors might address this question in a revised version of the paper.
As noted in the review, research culture is in itself complex due to multiple factors at play. The review highlights these complexities and the range of areas required to promote and encourage a good research culture. We agree with your comment and have highlighted these concerns within the revised version, thank you.

In the first paragraph of the introduction, I think it would be more appropriate to present the 'actions' that have been taken in chronological order.
Later in the introduction, it is stated that "attempts on reform requires commitment from everyone". While I agree with this claim, it sits oddly with the study design, which is focused only on research institutions. This is one of several instances where I lost sight of the coherence of the arguments being presented.
Thank you for your comment. Addressing this point in the introduction is a valid point, demonstrating how the Wellcome report highlighted the need for greater

commitment from not just research institutions (and demonstrating the complexity).

In the first paragraph of the section on Security and Career Progression, the authors identify "concerns over job security, career progression and sustainability…" but it is not clear to me what is meant by sustainability in this context.
Thank you. We have added some examples of what we mean by sustainability in this context.

Later in this section it is stated that "The evidence suggests that offering potential solutions or supportive actions for academic institutions and the research community may enhance and stabilise career paths, particularly those in the early career stage, including those in technical and managerial roles." This is a rather vague and weak statement. What solutions have been identified? Who is responsible for them and how effective are they? What does it mean to enhance a career path?
We have referred the reader to the table, which provides the evidence for this section. We didn't elaborate within the text as we would be duplicating what is reported in table 2. Several solutions are reported in the table, and as reported, a range of individuals are responsible for initiating them (individuals themselves, research organisations, departments, HR etc).

On page 19 it is stated (with regard to the replication crisis) that "Determining where effort is most needed and what changes are required, not only provides opportunity for the research ecosystem but also how RPOs and RFOs can mandate open research practices, and therefore coordinate change at both research integrity and researcher integrity level…". This is another rather vague claim where analysis is lacking. What specific changes might be made? Could the authors also address the very live debates around the merits and demerits of using mandates?
Thank you for your comment. Like the above statement, the scoping review provided a summary of the evidence found rather than analysing the evidence (another type of review approach would be needed for this). The purpose here was to highlight and assess the scope of the literature and map it to specific areas (the four areas reported in the Wellcome report).

In the Discussion, the sentence "The increasing competitiveness within the research environment, with research funding organisations (RFOs) placing greater focus on impact rather than creativity and innovation, is causing a global initiative for cultural change" doesn't make sense to me. Is it not increasing awareness of the harmful impacts of research competition that is leading many stakeholders across the world to focus attention on improving research culture. This is just one example of what I find to be a rather fuzzy style of writing. This sense is compounded by the repetition of the phrase "the evidence suggests". As noted above, I would like to see the authors doing a better job of sifting and weighing the evidence.
This section has been revised in a previous version. However, weighing or providing an analytical account of the included evidence is out of scope for scoping reviews. Scoping reviews aim to understand *'What has been done previously?'* and *'What does the literature say?'* compared to systematic reviews that ask the question *'Does this intervention work for this group of individuals?*

The last paragraph of the Conclusions is not really a conclusion. It is to my mind a description of a situation that was evident before reading this review. The first paragraph begins with the statement that "The review has shown that there is a wealth of evidence suggesting how and where changes are needed to establish a global cultural change to the research ecosystem. " I think it would add a great deal of value to the review if the authors could identify what they think are the most important changes. This would have the potential to focus the attention of the sector on the most urgent actions to be undertaken.
Thank you for your comment. We have extended the conclusions and included the Vitae citation.
However, we have not directed the reader to specific priorities as we feel this would add bias to the review. As already noted there are several areas in the tables under the four areas that would be considered to some as priority but may not be to someone else. On this basis, it would be the readers decision to understand what is priority to them and their institution based on what is feasible and within their control.

Competing Interests: No competing interests were disclosed.

Reviewer Report 30 May 2024

https://doi.org/10.5256/f1000research.161809.r277505

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Elizabeth Gadd
Loughborough University, Loughborough, England, UK

Thank you for the opportunity to review this scoping review on what constitutes a good research culture, and thank you to the authors for taking the time to share their review with a wider audience through this piece.

I make a number of minor comments against some of the article's headings below, however I think there are some more fundamental issues that it would be helpful to address to secure the scientific soundness of this article and therefore its contribution to the literature.

1) Clarity & consistency around the dimensions of research culture being investigated
It's not clear how the particular lenses of open research, career research paths (recognition & awards) & EDI mentioned in the background section were chosen given the research question appears to put no boundaries around the elements of poor research culture & the benefits of a good culture and what it looks like. In the methods section, the dimensions of research culture under investigation appear to have changed to 'four key areas highlighted from existing published work from the Wellcome Trust'. The argument given is that it will ensure consistency and

continuity to predefined areas already established by the research environment.' (I'm not sure to what the authors refer when they use the phrase 'the research environment' here.) It's unclear at this point what these four areas are, and why they were selected. Again, why be guided by the WT if the research question is to consider the problems and benefits of poor/good research cultures more broadly? It would be helpful if a stronger case was made for the dimensions of research culture being used to analyse the literature given the specific research questions of the study.

2) The use of the research questions as a study frame
Having stated the research questions, they don't seem to provide a strong framework for the rest of the article. For example, Figure 2 summarises the evidence relating to 'what makes a good research culture' but not relating to the other elements of the research question (what are the problems with research culture and what benefits does it bring). If all three questions were being considered together, the heading of the figure could be changed.

The research questions are not referred back to in the findings, discussion or conclusions, which leads to a loss of structure and clarity.

3) Superficial and incomplete analyses of the literature reviewed
Some of the evidence summaries feel superficial and possibly incomplete. Take as an example the sentence: "Evidence suggests that this [evaluating academic performance based on the use of inadequate proxies] can result in a lack of workload oversight, a culture discouraging of appreciation, that in turn makes researchers feel pressured to be successful, often resulting in a significant amount of time in pursuit of success at the cost of their wellbeing." I know this literature quite well, and I don't think a lack of workload oversight and a culture of discouraging appreciation are the key issues with the overuse of publication metrics.

Again, in the Wellbeing & equality of opportunity section the authors write: 'Researchers are incentivized to attain research excellence, which can often result in hyper-competitiveness and unfair working practices.' However, it's generally agreed that the problem lies not so much in the pursuit of excellence so much as how narrowly excellence is defined.

I provide some other examples below but this is not a complete list.

4) Poor phraseology
The findings of the review are often obscured by somewhat tortuous phrasing and unclear writing. For example, in the research quality and accountability statements table, one statement reads: 'Develop a coordinated approach to incentivize open access policies to optimise a positive cultural shift based on Government recognition of UK Research and Innovation's position on open access research practice, (including European and international position and status of progression/advancement in open research)'. It's not clear to me what this is saying, nor whether reference to one nation's policy position is meaningful.

Again, in the Wellbeing & equality of opportunity section, one sentence reads: 'As the evidence has shown, working relationship challenges in research culture require structural changes by transforming people, places, and practices.'

I provide some other examples below, but this is by no means a complete list.

I think it would be helpful if the authors scrutinise every sentence to ask, is this strictly accurate? How might this be misinterpreted? Am I representing the authors of the literature carefully? Have we identified the major themes?

5) Stronger discussion & conclusions
Finally, I find the discussion section rather unstructured and unclear. New points are introduced in the discussion that are not reported in the findings, e.g., reference to digital tools. The reader is not left with a clear sense as to what the authors proposed answers to the research questions are.

Minor corrections
Background
Minor Correction: "Funding organisations such as UK Research and Innovation (UKRI) enhanced its 2021-2022 allocation of research culture funding to Higher Education Providers (HEPs) to further explore research processes and experiences of working in research, through piloting new initiatives or enhancing existing activities." - this funding is from Research England to English HEPs:

Minor: "The consequences and challenges associated to an inadequate research culture is well evidence" - should be 'associated with' and 'are well evidenced'

Methods
Minor: The term 'non-academic staff' is largely seen as derogatory - defining a group of people by what they are not. Research-enabling staff is a term in more common parlance now. Or professional services if you are looking more broadly.

Search strategy
Minor: citations should be references I think?

Data extraction & evidence selection
Minor: Citation needed for Rayyan

Minor: I appreciate the work was carried out prior to the Vitae Research Culture study which identified 4 different core domains, however it would be good to mention this work as there is a lot of overlap with this paper.

- How research is managed and undertaken
- How research ensures value
- How people are supported
- How individuals engage with others

Minor: the numbers in the PRISMA flow diagram don't add up. The authors should take another look at this.

Characteristics of the included studies
Minor: It should read 'conference papers' not 'conference proceedings'.

Minor: UK is part of Europe. Is the 17 a subset of the 36 or separate to?

Summarising the evidence

Minor: Could be clearer as to what you mean by 'career type'. Career pathway? Job family?

Minor: I'm not sure what the term 'statements' refers to in Table 2. 'Statement' implies a citation from the literature, but these are very complex so I don't think that's what's being provided.

Wellbeing and equality of opportunity
Minor: just be careful with phrasing - 'The pandemic also initiated ‘kindness in research'' - I think you mean that the pandemic led to calls for more kindness in research? When writing reviews of this type, it's important to be strictly accurate as to exactly what was being suggested.

Minor: Para beginning 'These practices' - it's not clear to what practices this refers?

Research quality & accountability
Minor: This isn't quite accurate. 'the evidence...highlighted several issues inhibiting open research practices, which some have termed as a ‘replication or reproducibility crisis’. I think you mean that a link was made between open research and reproducibiity, but not that open research practices were termed a 'replication or reproducibilty crisis'?

Discussion
Minor: The report mentioned here: 'As noted in the recent Research and Development report on people and culture strategy, high quality research and innovation requires an acknowledgment of the full range of people needed.[8]'
is not a Research & Development report, but the BEIS R&D People & Culture Strategy.

Minor: To what research group does this refer? 'The health of the research group and those that lead them has been identified as an area that universities need to pay more attention to'.

Minor: The term 'impact' should be clarified throughout the article. In REF the term is used to describe non-academic impact. However, in the following sentence I think it refers to citation impact? ''The increasing competitiveness within the research environment, with research funding organisations (RFOs) placing greater focus on impact rather than creativity and innovation, is causing a global initiative for cultural change.' Either way, I'm not sure this sentence is strictly accurate.

Are the rationale for, and objectives of, the Systematic Review clearly stated?
Yes

Are sufficient details of the methods and analysis provided to allow replication by others?
Partly

Is the statistical analysis and its interpretation appropriate?
Not applicable

Are the conclusions drawn adequately supported by the results presented in the review?
Yes

If this is a Living Systematic Review, is the ‘living’ method appropriate and is the search schedule clearly defined and justified? (‘Living Systematic Review’ or a variation of this term

should be included in the title.)
Not applicable

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Research assessment; research culture; scholarly communication; open research.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 18 Jun 2024

Amanda Blatch-Jones

Reviewer comment: 1) Clarity & consistency around the dimensions of research culture being investigated
It's not clear how the particular lenses of open research, career research paths (recognition & awards) & EDI mentioned in the background section were chosen given the research question appears to put no boundaries around the elements of poor research culture & the benefits of a good culture and what it looks like.
Author response: These areas were chosen as a result of the Wellcome Trust survey and the areas reported in their report. The review focused on what the solutions could be rather than focusing on the barriers and challenges to a good research culture (due to the existing coverage in the literature). The aim of the review was to therefore consider the evidence about solutions and what the research community could consider. However, we have amended the last paragraph to add some additional context to address your comment.

Reviewer comment: In the methods section, the dimensions of research culture under investigation appear to have changed to 'four key areas highlighted from existing published work from the Wellcome Trust'. The argument given is that it will ensure consistency and continuity to predefined areas already established by the research environment.' (I'm not sure to what the authors refer when they use the phrase 'the research environment' here.) It's unclear at this point what these four areas are, and why they were selected. Again, why be guided by the WT if the research question is to consider the problems and benefits of poor/good research cultures more broadly? It would be helpful if a stronger case was made for the dimensions of research culture being used to analyze the literature given the specific research questions of the study.
Author response: We have revised the manuscript to be more descriptive of what the four areas are, along with what we mean by research environment (changed to research community based on the participants and respondents to the Wellcome Trust research cultures work).

Reviewer comment: 2) The use of the research questions as a study frame
Having stated the research questions, they don't seem to provide a strong framework for the rest of the article. For example, Figure 2 summarises the evidence relating to 'what

makes a good research culture' but not relating to the other elements of the research question (what are the problems with research culture and what benefits does it bring). If all three questions were being considered together, the heading of the figure could be changed.
Author response: The challenges and problems around research culture are well documented in the literature and we approached the research questions simultaneously, with more focus on solutions and what good research culture could look like. For each of the four areas, we have provided a summary of the challenges to address this part of the research question, with the main emphasis being the second part of the research question. The tables and figure 2 purposively focus on what constitutes a good research culture to address the challenges and barriers, to encourage a cultural shift with actionable actions. The purpose of the review was to focus on solutions rather than what the current challenges are, as these are well documented.

Reviewer comment: The research questions are not referred back to in the findings, discussion or conclusions, which leads to a loss of structure and clarity.
Author response: We have made this clearer in the revised manuscript and referred back to the research questions.

Reviewer comment: 3) Superficial and incomplete analyses of the literature reviewed
Some of the evidence summaries feel superficial and possibly incomplete. Take as an example the sentence: "Evidence suggests that this [evaluating academic performance based on the use of inadequate proxies] can result in a lack of workload oversight, a culture discouraging of appreciation, that in turn makes researchers feel pressured to be successful, often resulting in a significant amount of time in pursuit of success at the cost of their wellbeing." I know this literature quite well, and I don't think a lack of workload oversight and a culture of discouraging appreciation are the key issues with the overuse of publication metrics.
Again, in the Wellbeing & equality of opportunity section the authors write: 'Researchers are incentivized to attain research excellence, which can often result in hyper-competitiveness and unfair working practices.' However, it's generally agreed that the problem lies not so much in the pursuit of excellence so much as how narrowly excellence is defined.
I provide some other examples below but this is not a complete list.
Author response: Thank you for your comments and feedback. We have revised the two areas you mentioned and have carefully considered and reviewed the rest of the manuscript.

Reviewer comment: 4) Poor phraseology
The findings of the review are often obscured by somewhat tortuous phrasing and unclear writing. For example, in the research quality and accountability statements table, one statement reads: 'Develop a coordinated approach to incentivize open access policies to optimise a positive cultural shift based on Government recognition of UK Research and Innovation’s position on open access research practice, (including European and international position and status of progression/advancement in open research)'. It's not clear to me what this is saying, nor whether reference to one nation's policy position is

meaningful.
Author response: Thank you. We have amended the statement to make it clearer to the reader.

Reviewer comment: Again, in the Wellbeing & equality of opportunity section, one sentence reads: 'As the evidence has shown, working relationship challenges in research culture require structural changes by transforming people, places, and practices.'
Author response: We have amended the sentence to be more cohesive.

Reviewer comment: I provide some other examples below, but this is by no means a complete list.
I think it would be helpful if the authors scrutinize every sentence to ask, is this strictly accurate? How might this be misinterpreted? Am I representing the authors of the literature carefully? Have we identified the major themes?
Author response: Thank you. We have reviewed the manuscript and made several changes to make it more readable and coherent.

Reviewer comment: 5) Stronger discussion & conclusions
Finally, I find the discussion section rather unstructured and unclear. New points are introduced in the discussion that are not reported in the findings, e.g., reference to digital tools. The reader is not left with a clear sense as to what the authors proposed answers to the research questions are.
Author response: We have revised the discussion and conclusion to make it clearer to the reader and follow a more structured approach.

Reviewer comment: Minor corrections
Background
Minor Correction: "Funding organizations such as UK Research and Innovation (UKRI) enhanced its 2021-2022 allocation of research culture funding to Higher Education Providers (HEPs) to further explore research processes and experiences of working in research, through piloting new initiatives or enhancing existing activities." - this funding is from Research England to English HEPs:
Author response: Thank you. We have addressed this correction and amended the sentence accordingly.

Reviewer comment: Minor: "The consequences and challenges associated to an inadequate research culture is well evidence" - should be 'associated with' and 'are well evidenced'
Author response: Thank you, we have amended accordingly.

Reviewer comment: Methods
Minor: The term 'non-academic staff' is largely seen as derogatory - defining a group of people by what they are not. Research-enabling staff is a term in more common parlance now. Or professional services if you are looking more broadly.
Author response: Thank you. We have replaced with research-enabling staff due to the

scope of the review.

Reviewer comment: Search strategy
Minor: citations should be references I think?
Author response: We have amended the manuscript to refer to references rather than citations to make it clearer to the reader.

Reviewer comment: Data extraction & evidence selection
Minor: Citation needed for Rayyan
Author response: A link to Rayyan is now included.

Reviewer comment: Minor: I appreciate the work was carried out prior to the Vitae Research Culture study which identified 4 different core domains, however it would be good to mention this work as there is a lot of overlap with this paper.

- How research is managed and undertaken
- How research ensures value
- How people are supported
- How individuals engage with others

Author response: This has now been included in the manuscript as part of the overall introduction and discussion.

Reviewer comment: Minor: the numbers in the PRISMA flow diagram don't add up. The authors should take another look at this.
Author response: Thank you for noticing this. We have rectified the error in the PRISMA flow diagram and have updated accordingly.

Reviewer comment: Characteristics of the included studies
Minor: It should read 'conference papers' not 'conference proceedings'.
Author response: We have amended to reflect your comment.

Reviewer comment: Minor: UK is part of Europe. Is the 17 a subset of the 36 or separate to?
Author response: We separated UK from Europe so that we could see what initiatives were specifically being conducted in the UK as funding, academic institutions etc work differently across country. As reported the 17 UK are separate to Europe, so the total across Europe was 43). We have adjusted the manuscript to be more concise.

Reviewer comment: Summarizing the evidence
Minor: Could be clearer as to what you mean by 'career type'. Career pathway? Job family?
Author response: We have provided an explanation with examples on the first mention of career type.

Reviewer comment: Minor: I'm not sure what the term 'statements' refers to in Table 2. 'Statement' implies a citation from the literature, but these are very complex so I don't think that's what's being provided.
Author response: We have changed ‘statements’ for all tables and have amended with key

areas and considerations associated to [what the theme was].

Reviewer comment: Wellbeing and equality of opportunity
Minor: just be careful with phrasing - 'The pandemic also initiated 'kindness in research'' - I think you mean that the pandemic led to calls for more kindness in research? When writing reviews of this type, it's important to be strictly accurate as to exactly what was being suggested.
Minor: Para beginning 'These practices' - it's not clear to what practices this refers?
Author response: Thank you. We have amended the sentences accordingly.

Reviewer comment: Research quality & accountability
Minor: This isn't quite accurate. 'the evidence...highlighted several issues inhibiting open research practices, which some have termed as a 'replication or reproducibility crisis'. I think you mean that a link was made between open research and reproducibility, but not that open research practices were termed a 'replication or reproducibility crisis'?
Author response: Thank you. We have amended the sentence accordingly.

Reviewer comment: Discussion
Minor: The report mentioned here: 'As noted in the recent Research and Development report on people and culture strategy, high quality research and innovation requires an acknowledgment of the full range of people needed.[8]' is not a Research & Development report, but the BEIS R&D People & Culture Strategy.
Author response: We have amended the manuscript accordingly.

Reviewer comment: Minor: To what research group does this refer? 'The health of the research group and those that lead them has been identified as an area that universities need to pay more attention to'.
Author response: We have provided more details to make it clearer to the reader.

Reviewer comment: Minor: The term 'impact' should be clarified throughout the article. In REF the term is used to describe non-academic impact. However, in the following sentence I think it refers to citation impact? ''The increasing competitiveness within the research environment, with research funding organizations (RFOs) placing greater focus on impact rather than creativity and innovation, is causing a global initiative for cultural change.'
Either way, I'm not sure this sentence is strictly accurate.
Author response: We have adjusted and amended the manuscript where necessary.

Competing Interests: No competing interests were disclosed.

Reviewer Report 28 May 2024

https://doi.org/10.5256/f1000research.161809.r277499

Elisabeth Grey
Bristol Medical School and NIHR Applied Research Collaboration (ARC) West, University of Bristol, Bristol, England, UK

Thank you for asking me to review this interesting scoping review on research culture in research institutions. The manuscript is well-written and comprehensive, providing clear details on the methods and supplementary materials to enable other researchers to replicate the searches. I only have a few very minor suggestions that I think would help clarify a few things in the text:

In the Abstract, there are two stated aims, one under Background and one under Aims – these are not quite the same and I think it would be better to stick with one or the other (the first matches what is in the main text).

Inclusion criteria or Types of sources – I think this needs a statement on the types of initiative that were studied e.g., 'all initiatives aimed, partly or wholly, at improving research culture were included'. Or this may need to broader if reports were included about initiatives that did not specifically aim to improve research culture, but the impact on this was measured.

In the PRISMA flow diagram, the reasons for exclusion are only provided for the academic records – could they be added for the grey records too?

You mention that many of the articles were relevant to more than one of the four focus areas – could you add a little to the Methods to explain how you decided which area to categorise a report under in these cases? Or were they included in the synthesis for each category they related to (would be good to state this)?

There is a typo in the fourth paragraph under 'Research quality and accountability' – 'algin'?

Table 4 and Table 5 have the same title – I think Table 5 should be Key concepts and statements associated with research quality and accountability

It struck me that none of the concepts under 'Security and career progression' seemed to relate to job security, only career progression. This would be worth highlighting – ultimately to improve job security, research institutions and funders need to rethink how research positions are funded. Innovation is needed here but this review suggests that nothing is happening on this front.

Are the rationale for, and objectives of, the Systematic Review clearly stated?
Yes

Are sufficient details of the methods and analysis provided to allow replication by others?
Yes

Is the statistical analysis and its interpretation appropriate?

Not applicable

Are the conclusions drawn adequately supported by the results presented in the review?
Yes

If this is a Living Systematic Review, is the 'living' method appropriate and is the search schedule clearly defined and justified? ('Living Systematic Review' or a variation of this term should be included in the title.)
Not applicable

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Health behaviour, health communication, qualitative methods, systematic reviews

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Author Response 18 Jun 2024

Amanda Blatch-Jones

Reviewer response: In the Abstract, there are two stated aims, one under Background and one under Aims – these are not quite the same and I think it would be better to stick with one or the other (the first matches what is in the main text).
Author response: Thank you. We have replaced the aims with the following: The purpose of the scoping review was to explore '*What does the evidence say about the 'problem' with 'poor' research culture, what are the benefits of 'good' research culture, and what does 'good' look like?'*

Reviewer response: Inclusion criteria or Types of sources – I think this needs a statement on the types of initiative that were studied e.g., 'all initiatives aimed, partly or wholly, at improving research culture were included'. Or this may need to broader if reports were included about initiatives that did not specifically aim to improve research culture, but the impact on this was measured.
Author response: Thank you. We have included and revised your suggestion: All initiatives aimed, partly or wholly, at enhancing or assessing research culture were included.

Reviewer response: In the PRISMA flow diagram, the reasons for exclusion are only provided for the academic records – could they be added for the grey records too?
Author response: The flow diagram has been amended to include the exclusions and reasons.

Reviewer response: You mention that many of the articles were relevant to more than one of the four focus areas – could you add a little to the Methods to explain how you decided which area to categorise a report under in these cases? Or were they included in the synthesis for each category they related to (would be good to state this)?

Author response: We have added more detail about the four areas and how we allocated each article to an area or areas. "Both reviewers applied the articles under one of the four areas during extraction, based on the content and context of the article. Some articles were relevant to more than one category, which was reflected in the data extraction table. The reviewers independently checked the included articles to ensure that they were included appropriately across the four areas."

Reviewer response: There is a typo in the fourth paragraph under 'Research quality and accountability' – 'algin'?
Author response: Thank you. This has now been amended.

Reviewer response: Table 4 and Table 5 have the same title – I think Table 5 should be Key concepts and statements associated with research quality and accountability
Author response: Thank you for pointing this out. Table 5 title has been changed accordingly.

Reviewer response: It struck me that none of the concepts under 'Security and career progression' seemed to relate to job security, only career progression. This would be worth highlighting – ultimately to improve job security, research institutions and funders need to rethink how research positions are funded. Innovation is needed here but this review suggests that nothing is happening on this front.
Author response: Thank you. We have added the following sentence to the second paragraph under table 2. "To improve job security, research institutions and funding organizations need to readdress how research positions are funded, particularly in the early career stage."
Innovation was discussed in the some of the articles and these are reflected in the appropriate statements. We have tried to be inclusive to the areas that were most discussed, innovation for this area was more limited than the others (possibly due to challenges, barriers and competing interests around job security and progression). It is a valid point and thank you for bringing it up.

Competing Interests: No competing interests were disclosed.

Reviewer Report 23 May 2024

https://doi.org/10.5256/f1000research.161809.r277506

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Steven De Peuter
KU Leuven, Leuven, Flanders, Belgium

I have read this scoping review with interest. The authors have compiled and synthesized an impressive collection of works, both from academic sources and from popular sources. I was pleasantly surprised to see that they even included two podcasts.

The authors not only review aspects of the research culture that are problematic. They also search the literature for evidence of what constitutes a good research culture and what can be done to promote it. That they limit their search to recently published material is not problematic: only recently has the shift been made from "codification and compliance" and from preventing the bad from happening towards promoting a healthy climate. It allows researchers and policy makers to get a better view on what is currently known about good research culture. The paper's recommendations are clear and impressively complete, excellently summarizing the collected evidence, both in the text and in the clearly structured and comprehensive tables. The structure of the themes is also intuitive.

I applaud the authors for their work and I want to emphasize that I consider this a relevant, solid, and quite exhaustive review. I have, however, a number of (minor) comments that I list below. Their purpose is solely to improve the relevance and reach of the paper, which I believe deserves a wide audience.

- Background, Discussion, Conclusions

The Background section is very much to the point. For readers who are familiar with the topic of research culture, it is sufficient to have the high-level overview of the main points that the paper currently provides. For interested readers who are less familiar with the topic the background section may be too high-level. The overview remains abstract and could benefit from more specific information and examples. For example, what is "the potential negative impact of a poor research culture / the consequences and challenges associated to an inadequate research culture"? What are some recommendations from the "international actions to address the underlying drivers of poor research culture"? (Which drivers are there?)

Related to this, I think the Dicussion section would benefit from a brief recap of the main findings in the first paragraph(s), instead of just stating "From the evidence, it was clear that there were several initiatives to seek a cultural change across the research institutions/Higher Education Institutions." The same applies to the conclusions. The authors correctly and rightfully emphasize the fact that "research institutions cannot act in isolation", but in my opinion some of the findings deserve equal emphasis – and therefore being mentioned in the conclusions. In general, I think one of the conclusions could also be that there is *a lot* that can be done and that the evidence base for promoting a good research culture is substantial.

When reading the paper, it felt a bit like I was reading a – very well written – internal report for policy makers who are knowledgeable of the potential problems with(in) research culture. I think it can be leveraged to also appeal to a broader audience.

- Methods

The *Types of sources* section confused me when I first read it, leading me to think that *only* empirical papers ("studies") were included. Further on, it became evident that the authors included a wide variety of contributions. I suggest adding a first sentence to this section describing this, then continue by detailing the various types of studies and data that were included as it is

currently documented.

- Results

The PRIMSA flow diagram (Figure 1) is incorrect. The total of the "Full-text articles excluded, with reasons (n = 513)" differs from the sum of the specific reasons (sum = 670). It appears that the latter is correct, because 924 papers screened – 670 excluded equals 254 included. Please note that there is still one paper that seems to have disappeared: Figure 1 and the main text mention 253 included papers, not 254.
Unfortunately, in spite of the impressive amount of information that is confined in the Tables and despite my admiration for the work the authors must have put into presenting the evidence this way, there are inconsistencies between the number of references that are mentioned with the statements and the last column of the tables. You could consider this comment as an obsessive form of nitpicking from my part. I am aware of that. However, I believe that having a complete overview of the evidence associated with each statement will allow future readers to consult the relevant sources.

Table 2
Theme *Promote fair and transparent process for career progression*
Statement 2: number of references with statement = 39; last column = 35
Statement 3: number of references with statement = 29; last column = 30
Statement 6: number of references with statement = 20; last column = 21
Theme *Reduce hyper competition and provide a culture of kindness*
Statement 2: number of references with statement = 23; last column = 24
Theme *Cultivate a culture of support that fosters a diverse set of skills and career pathways*
Statement 1: number of references with statement = 33; last column = 34
Statement 4: number of references with statement = 26; last column = 27

Table 3
Theme *Embed and support an inclusive culture*
Statement 1: number of references with statement = 44; last column = 43
Statement 2: number of references with statement = 40; last column = 41
Theme *Investing in people to reduce burden and improve wellbeing*
Statement 1: number of references with statement = 39; last column = 42
Statement 3: number of references with statement = 24; last column = 27

Table 4
Theme *Everyone feeling valued and having equality of opportunities to contribute*
Statement 2: number of references with statement = 25; last column = 24

Table 5
Theme *Creation and facilitation*
Statement 1: number of references with statement = 73; last column = 74
Statement 2: number of references with statement = **54** (!!!); last column = 71
Statement 3: number of references with statement = 45; last column = 46
Statement 4: number of references with statement = 43; last column = 44
Theme *Fostering transparency and visibility*
Statement 2: number of references with statement = 49; last column = 51
Statement 3: number of references with statement = 37; last column = 38

Statement 6: number of references with statement = 12; last column = 13

- Study strengths and limitations

First paragraph: I would suggest to also include the percentage of articles from the USA, analogous to Canada and other international countries.

- General comments

Some of the sentences feel odd. For example, in *Wellbeing and equality of opportunity*, second paragraph, "The evidence suggests that these issues have an impact not only at the institutional level such as having a lack of diversity in organisational leaderships, but also for individuals, leading to a lack of role models and peer mentors skills shortages in particular disciplines, sectors and roles, and drives off talent." is a run-on and feels like a collation of several sentences. Please check.
Some of the Statements in the tables are also long and may better be divided into several shorter sentences. Some examples:
Table 2, Statement 3 under theme *Reduce hyper competition and provide a culture of kindness* "Consider ways to demonstrate support for other researchers to secure funding as part of progression (and review current reward systems), ensuring education, teaching and research are equally prioritised": who is referred to by "other"?
Table 5, under theme *Fostering transparency and visibility* Statements 2 and 7 feel odd. It seems like parts of the statements are missing. Please reformulate.

- Typo's

Abbreviations list
COPE is the "Committee on Publication Ethics", not "of" – the same typo is in Table 5 (theme "Fostering transparency and visibility" number 3 "Gain greater understanding…")
ENRI: do the authors mean European Network of Research Integrity *Offices (ENRIO* - https://www.enrio.eu/*)*, or maybe *ENERI*, the "European Network for Research Ethics and Integrity" (https://eneri.eu)? If corrected, please also correct the mention of ENRI in Table 5 (same place as COPE) and in the last paragraph before the Discussion section.
KPI à capitalize "Performance"
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3d paragraph: The consequences of poor research culture does (change into "do") not only impact researchers, it also effects (change into "affects") research support staff…
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Research quality and accountability – open and trustworthy research 4th paragraph: change "algin" into "align"
Tables
In Table 2, under theme *Cultivate a culture of support that fosters a diverse set of skills and career pathway* the references of Statement 8 are not included as links (they are also between brackets). This may be a formatting problem beyond the authors' control, though.
In Table 3, under theme *Embed and support an inclusive culture* Statement 6: …including shift (change into "shifting") institutional practice…
In Table 3, under theme *Making use of and learning from existing tools and initiatives to support*

cultural change there is no space before the opening bracket in Statement 2
In Table 5, under theme *Incentives and innovation* Statement 1 mentions (at the end) "open assess movement". Do the authors maybe mean "open access movement"?
In Table 5, under theme *Fostering transparency and visibility* Statement 5 please change "CREDiT" into "CRediT"
Other
Seeing "life-work balance" mentioned in Table 3 made me smile. However, in the section *Wellbeing and equality of opportunity* and in the Discussion section the authors shift to work-life balance, also using "work/life balance" in the discussion. Please be consistent.

Are the rationale for, and objectives of, the Systematic Review clearly stated?
Yes

Are sufficient details of the methods and analysis provided to allow replication by others?
Yes

Is the statistical analysis and its interpretation appropriate?
Not applicable

Are the conclusions drawn adequately supported by the results presented in the review?
Yes

If this is a Living Systematic Review, is the 'living' method appropriate and is the search schedule clearly defined and justified? ('Living Systematic Review' or a variation of this term should be included in the title.)
Not applicable

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Research integrity, research culture, behavior change, health psychology, change management

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 18 Jun 2024

Amanda Blatch-Jones

Background: The overview remains abstract and could benefit from more specific information and examples. For example, what is "the potential negative impact of a poor research culture / the consequences and challenges associated to an inadequate research culture"? What are some recommendations from the "international actions to address the underlying drivers of poor research culture"? (Which drivers are there?)
We have amended the first paragraph to provide more content and greater clarity for the reader.

Related to this, I think the Discussion section would benefit from a brief recap of the main findings in the first paragraph(s), instead of just stating "From the evidence, it was clear that there were several initiatives to seek a cultural change across the research institutions/Higher Education Institutions."
We have added to the first part of the discussion emphasising some of the key points as suggested.

The same applies to the conclusions. The authors correctly and rightfully emphasize the fact that "research institutions cannot act in isolation", but in my opinion some of the findings deserve equal emphasis – and therefore being mentioned in the conclusions. In general, I think one of the conclusions could also be that there is *a lot* that can be done and that the evidence base for promoting a good research culture is substantial.
Thank you for your comments and we have included your suggested conclusion comment into the manuscript. We have also amended the sentence "research institutions cannot act in isolation."

When reading the paper, it felt a bit like I was reading a – very well written – internal report for policy makers who are knowledgeable of the potential problems with(in) research culture. I think it can be leveraged to also appeal to a broader audience.
Thank you for your feedback. We have made notable changes to the manuscript which we hope provides greater coverage for a broader audience.

Methods: The *Types of sources* section confused me when I first read it, leading me to think that *only* empirical papers ("studies") were included. Further on, it became evident that the authors included a wide variety of contributions. I suggest adding a first sentence to this section describing this, then continue by detailing the various types of studies and data that were included as it is currently documented.
Thank you for your suggestion. We have included an opening sentence for this sub-heading. "Several types of contributions were used for the scoping review, which included articles, reports, blogs and web-based articles from both empirical studies and grey literature."

Results: The PRIMSA flow diagram (Figure 1) is incorrect. The total of the "Full-text articles excluded, with reasons (n = 513)" differs from the sum of the specific reasons (sum = 670). It appears that the latter is correct, because 924 papers screened – 670 excluded equals 254 included. Please note that there is still one paper that seems to have disappeared: Figure 1 and the main text mention 253 included papers, not 254.
Unfortunately, in spite of the impressive amount of information that is confined in the Tables and despite my admiration for the work the authors must have put into presenting the evidence this way, there are inconsistencies between the number of references that are mentioned with the statements and the last column of the tables. You could consider this comment as an obsessive form of nitpicking from my part. I am aware of that. However, I believe that having a complete overview of the evidence associated with each statement will allow future readers to consult the relevant sources.

Thank you for pointing this out on the PRISMA flow diagram. Having gone back to the reference manager the error has been corrected. The number of exclusions were 671 and the missing article was not recorded. This has now been amended.

Thank you for your thoughtful comment and paying particular attention to the mismatch between the number of references cited for each statement and the count of these references in the tables. We really appreciate your attention to detail and have made the relevant changes and have double checked these for consistency.

Table 2
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Statement 2: number of references with statement = 39; last column = 35
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Statement 1: number of references with statement = 33; last column = 34
Statement 4: number of references with statement = 26; last column = 27
Thank you. We have adjusted the frequencies and have doubled checked all the other statements for clarity.

Table 3
Theme *Embed and support an inclusive culture*
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Table 5
Theme *Creation and facilitation*

Statement 1: number of references with statement = 73; last column = 74
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Statement 3: number of references with statement = 37; last column = 38
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Thank you. We have adjusted the frequencies and have doubled checked all the other statements for clarity.

Study strengths and limitations: First paragraph: I would suggest to also include the percentage of articles from the USA, analogous to Canada and other international countries.
These figures and sentence has been adjusted to reflect the accuracy of the percentages in table 1.

General comments: Some of the sentences feel odd. For example, in *Wellbeing and equality of opportunity*, second paragraph, "The evidence suggests that these issues have an impact not only at the institutional level such as having a lack of diversity in organisational leaderships, but also for individuals, leading to a lack of role models and peer mentors skills shortages in particular disciplines, sectors and roles, and drives off talent." is a run-on and feels like a collation of several sentences. Please check. (1)
Some of the Statements in the tables are also long and may better be divided into several shorter sentences. Some examples:
Table 2, Statement 3 under theme *Reduce hyper competition and provide a culture of kindness* "Consider ways to demonstrate support for other researchers to secure funding as part of progression (and review current reward systems), ensuring education, teaching and research are equally prioritised": who is referred to by "other"? (2)
Table 5, under theme *Fostering transparency and visibility* Statements 2 and 7 feel odd. It seems like parts of the statements are missing. Please reformulate. (3 and 4)
Thank you for your general comments on some of the sentences in the manuscript. We have amended these, which hopefully makes more sense for the reader.

1. **"The evidence suggests that these wellbeing issues can have an impact at an institutional level, resulting in a lack of diversity across leadership roles, a shortage of role models and peer mentors, and driving off talent due to staff leaving academia."**
2. **'other' has been taken out as that was a typo error. Thank you for drawing us to this statement.**

Due to the structure of the statements and how they emerged as part of the synthesis, it would be challenging to go back and re-evaluate these statements. We understand that some of them are longer than others, as we attempted to capture sufficient information to enable the reader to understand the content and context.

Statement 2 has been amended "Actively encouraging researchers to make their research more accessible and open through sharing protocols and data openly and transparently, could foster greater knowledge exchange opportunities."
Statement 7 has also been amended "Become a signatory of initiatives such as DORA and seek to engage with local and international networks such as the Reproducibility Network."

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Other
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Thank you for your additional suggestions on the typo's in the manuscript. We have addressed all your comments accordingly.

For the references, on statement 8, it is a formatting issue outside of our control (a request to F1000 has been made in the revised manuscript)

Competing Interests: No competing interests were disclosed.