Research Integrity in the UK

Annual statement of the UK Committee on Research Integrity

2024

UKCORI
UK Committee on Research Integrity

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Executive summary

Integrity is fundamental to good research. In this, the second annual statement of the Committee on Research Integrity, we provide a snapshot of the current condition of research integrity in the UK. It is a picture of a research sector which remains strong, but in which things are changing fast.

At a time when research-performing organisations are under increasing pressure, we need to work together across the UK research system to maintain our focus on research integrity.

It is critical that we collectively uphold and improve the integrity of the research that is carried out in the UK. A loss of trust in the integrity of research, whether among researchers themselves or the wider public, would be a serious matter. Upholding UK research integrity requires continual scrutiny and co-ordinated effort across a range of different organisations. Transparency in this area is vital, helping us to build the evidence base across the UK, so that we can monitor what is happening and identify where improvement and support is needed.

In this annual statement we encourage all research-performing organisations – including businesses, government departments and agencies, independent research organisations, as well as Higher Education Institutes (HEIs) – to communicate their ongoing efforts to support research integrity. By being visible in acting to support research integrity, these organisations help to uphold and strengthen the integrity of the research that is carried out in the UK. Most research-performing HEIs are producing and publishing annual statements on research integrity: our hope is that, over the coming years, all of them will do so.

Research publishers are also key stakeholders, as part of a research system that needs to maintain vigilance in order to uphold research integrity. There is a risk that high-profile international cases of research misconduct undermine trust in research: given their position in the system, publishers are well placed to invest in new systems and processes to address these issues and help maintain a trustworthy research record.

Looking across the research integrity landscape, our 2024 annual statement highlights three key areas in which there has been significant activity over the last year.

Given their importance, we have dedicated working groups on each of them:

- **one working group is looking at the possible development and use of indicators to generate evidence of research integrity within HEIs**
- **a second is focusing on research misconduct, working with other organisations to improve the way that we identify, investigate, record and learn from instances of alleged misconduct**
- **a third is looking at generative AI and its implications for research integrity, to consider how to manage the risks of AI, while making the most of its potential**

We see a landscape in which new challenges to research integrity are emerging, as well as new opportunities. For example, the challenges and opportunities that come with increasing awareness of open research and open data, and evolving Artificial Intelligence (AI) methods and tools.

We also see a landscape in which a great deal is happening to uphold research integrity. There is much that is very positive in the UK research system, including in research integrity. At a national and local level we see a movement towards greater co-ordination of effort, and greater understanding of research integrity in the UK. This is a movement to which many across the sector, including the Committee, are contributing.

Looking ahead, a review of the Concordat to Support Research Integrity is underway, aiming to ensure that the Concordat continues to support UK research. Revisions to the Research Excellence Framework are also in progress for the 2029 exercise, affecting future plans for the assessment of research in UK HEIs.

In line with the recommendations of the 2022 Independent Review on Reducing Research Bureaucracy,[1] it is essential that any resulting changes take account of the pressures that researchers and research-performing organisations are currently experiencing, with many HEIs feeling under-resourced and encumbered by bureaucratic burdens.

For our part, we will continue to raise the profile of research integrity within the sector and beyond, and we will carry on our work to strengthen the current UK evidence base. In this we will continue to collaborate with many other organisations, both in the UK and internationally, that share our awareness of the importance of research integrity. By working together, we can help to uphold research integrity in the UK, now and in the future.

Recommendations

- **Higher education institutions (HEIs):** to maintain transparency and accountability, it is vital that all HEIs meet expectations of the Concordat in the UK by producing and publishing annual statements on research integrity
- **Research funders and commissioners:** to maintain accountability, with minimal bureaucratic burden, funders and commissioners need to work together to help research-performing organisations, by providing the support that those organisations need and harmonising what is asked of them regarding integrity
- All **research-performing organisations**, including **government departments and agencies**: to demonstrate high standards of integrity, all research-performing organisations should be transparent about how they sustain and develop integrity
- **Research publishers**: to support the principles of integrity, research publishers need to demonstrate how they follow their own guidelines in support of research integrity
- **All groups involved in research assessment**: to help set the standard for the sector, groups involved in research assessment, including in relation to the Research Excellence Framework, should continue to apply and embed principles of integrity in their approaches

Introduction

The value of UK research

UK research is widely seen as a national asset of great value, with globally recognised strengths.[2] It remains the most highly cited research in the world, weighted for the number of citations that are expected in different research fields.[3] The UK research system is extensive, making contributions in diverse fields and subject areas.

Research supports the UK economy: it creates jobs, generates new businesses and helps established businesses to innovate, and it attracts billions of pounds of investment into the UK.[4,5]

The UK plays a considerable role in international research: in 2020 nearly 60% of UK research publications had co-authors from outside of the UK, a higher rate of international collaboration than in the other G7 countries, as well as Brazil, China, India and South Korea.[6]

At the same time, research is vital in tackling major challenges, both in this country and globally: from treating and preventing illness to mitigating and adapting to climate change. It underpins the UK's creative industries, helps to preserve cultural heritage, and enables us to understand culture, history, economics and politics. It makes it possible to make sense of both the potential and the challenges that come with new developments, such as those in AI. Research supports public services, by ensuring that policies are evidence-based, it also helps to provide the UK with the skilled workforce that it needs now and will need in the future.

The importance of research integrity

Integrity is fundamental to good research. Research integrity means carrying out research in a way that is trustworthy, ethical and responsible, and disseminating research in a way that builds trust and confidence: trust in the research methods that are applied, in the resulting research outputs, and in the funding, dissemination and assessment of research. Research with integrity is research that can be used effectively, contributing to the UK economy and society, and adding to knowledge worldwide.

Research integrity is central to every research field and approach, and it covers the whole of the research lifecycle: from the development of initial ideas and proposals to the ways in which research is conducted and research outputs are communicated, used and assessed.

It is vital that research processes and outputs can be relied upon, by:

- other researchers, who may use them to advance the state of knowledge in their subject areas
- industry, which may use research outputs to inform their own research and development programmes, and to innovate
- law-makers, who may use evidence to inform decision-making
- government and public sector organisations more broadly, which may base public policy on research (whether carried out themselves or by others)
- organisations in the health and social care sectors, which base their practice on research
- civil society groups, which rely on research in advocacy, and in producing guidance and advice
- individuals whose lives are affected by research, and whose taxes and charitable donations pay for much of the research that is carried out in UK HEIs[7]

Changes in technology and in society are contributing to an evolving research landscape, and this has implications for research integrity. Recently, many UK HEIs have been facing unprecedented levels and types of challenge – from growing use of AI (which also presents opportunities for HEIs) to increasing financial pressure.[8]

Upholding research integrity is the responsibility of:

The Concordat to Support Research Integrity

The Concordat to Support Research Integrity[9] ('the Concordat') is the UK's national framework on research integrity. Most recently revised in 2019, and undergoing revision in 2024, the Concordat includes principles and expectations for research integrity that apply to all research fields.

Signatories to the Concordat (which include research funders in the four constituent countries of the UK, as well as Universities UK and GuildHE) commit themselves to adhering to its principles. These include the expectation that research-performing organisations will produce and seek to publish annual statements detailing their approaches to research integrity within their organisations. Since 2013 many HEIs have been producing (and in many cases publishing) annual statements. Alongside HEIs, many UK government departments and public-sector bodies have followed suit, such as UK Research and Innovation (UKRI), GO-Science, the Ministry of Defence and the Cabinet Office. The Government has published guidance[10] to support departments and public-sector bodies on how they can implement the Concordat.

The role of the Committee on Research Integrity

While the majority of UK researchers and research organisations are publicly committed to upholding high standards of research integrity, there are concerns that pressures on individual researchers and on their institutions make it more difficult for them to act with integrity.[11]

Given the importance of research integrity to UK research, in 2018 the House of Commons Science and Technology Select Committee called for a new national committee to be established, with formal responsibility for promoting research integrity, and with the task of providing a clearer evidence base for research integrity in the UK.

The Committee's role and ethos is collaborative: we work with the many different stakeholders that have an interest in research integrity. Through our work plan,[12] we aim to:

- promote research integrity by identifying examples of good practice, embedding research integrity in discussions about research culture, and working across the UK research system to bring together existing groups involved in research integrity
- support research integrity by defining the current research integrity landscape, enhancing collaboration between stakeholders by creating opportunities for discussion, and making recommendations to and for the UK research system
- develop the evidence base for research integrity by gathering evidence about systemic pressures and enablers, advancing discussions about research integrity indicators, and assembling evidence about the relationship between research integrity and research quality
- help in setting new directions by advising the research sector on managing research misconduct and its impact on the research record, defining the future structures needed to support research integrity, and fostering innovative thinking and approaches to research integrity

The Committee has an important role as a co-ordinating, galvanising and convening body, bringing other organisations together to support our common cause of promoting research integrity. We provide strategic oversight, engaging with and listening to our stakeholders. We bring people together, by:

- convening organisations for whom research integrity is important
- providing a channel of communication to government, and understanding government concerns
- building the evidence base on UK research integrity, to help us monitor related activities, issues and developments
- working collaboratively to develop shared responses to particular challenges
- encouraging the sector to uphold and improve research integrity, showcasing good practice and highlighting gaps, helping research organisations see how they can embed research integrity in what they do
- raising awareness of what constitutes research integrity and why it matters

The Committee provides the UK with a cohesive approach to research integrity. We have held meetings across all four UK nations, and we represent perspectives on research integrity from across the research landscape: from many different subject areas and career stages, and different types of organisation.

We engage with stakeholders across:

- HEIs
- independent research organisations, academies, learned societies and institutes
- research funders
- publishers
- government bodies
- public, private and third-sector organisations

The Committee and other research integrity organisations

The Committee works closely with other research integrity organisations, both within the UK and internationally.

Within the UK, these organisations include the UK Research Integrity Office (an independent charity), the UK Reproducibility Network (a peer-led consortium), the Research Integrity Concordat Signatories Group (that provides oversight and leadership in this space), and the Scottish Research Integrity Network (a member-led forum).

Internationally, we pay close attention to the work of others such as the World Conference on Research Integrity, the European Network of Research Integrity Offices, the Committee on Publication Ethics (COPE), and the Center for Open Science in the US. We also draw on internationally recognised guidelines, such as the Singapore Statement on Research Integrity and the European Code of Conduct for Research Integrity. Our aim is to learn from other organisations, and to work together more efficiently and effectively, recognising the importance of collaboration.

About this annual statement

This is the second annual statement that the Committee has published. Building on our 2023 statement,[13] we highlight significant developments over the past year, both in our own work and in the work of other organisations.

In the following section we provide an overview of the current position of UK research integrity, insofar as we have evidence for it. We structure this section following the five principles of research integrity set out in the Concordat.

Subsequent sections explore in more depth three areas where the committee has chosen to give attention:

- the possible development and use of **indicators** to generate evidence of research integrity in HEIs
- improving the way that we identify, investigate, record and learn from any instances of alleged **misconduct**
- **AI** and its implications for research integrity

In each of these areas, Committee working groups have engaged with a range of stakeholders on important challenges and sought to develop shared approaches in addressing those challenges, where appropriate.

Finally, we provide a forward look, both in terms of the further work that we will undertake, the actions that we recommend that other organisations take, and wider developments and initiatives, both nationally and internationally, that will have an effect on UK research integrity.

UK research integrity: a snapshot

In this brief overview of the current state of UK research integrity, we follow the five interlinked principles of the Concordat to assess UK research integrity in relation to rigour, transparency and open communication, honesty, care and respect, and accountability. Our interpretation of what these principles mean remains unchanged from last year.

We have drawn on the most recent evidence that is currently available, as we work to identify evidence gaps and further develop reliable data on UK research integrity.

Research organisations in the UK have an ongoing commitment to transparency and to respond to questions about the integrity of the research they are producing. In recent years there has been a growing awareness among researchers that the culture and environment in which research takes place, and the systems and measures that are being used to evaluate that research, can have an impact on integrity.[14, 15, 16]

A comprehensive list of sources of evidence for UK research integrity can be found in the Committee's first annual statement. In 2024 we build on our previous work through further analysis and presentation of evidence, including further commissioned analysis of data from CEDARS, a survey of the views and experiences of research staff in HEIs. We have also commissioned new analysis of retractions of research papers and have published case studies on research integrity in practice[17].

The Culture, Employment and Development of Academic Researchers Survey (CEDARS) is a biennial survey carried out by career and professional development organisation CRAC-Vitae, to seek the views and experiences of individuals engaged in research within UK universities.

The question set is designed to support institutions' evaluation of their progress in implementing the Principles of the Concordat to Support the Career Development of Researchers.[18]

We have commissioned CRAC-Vitae to undertake further analysis of the CEDARS survey data for 2021 and 2023, looking specifically at levels of awareness of research integrity issues, confidence in processes related to research misconduct, and academic researchers' interest in training related to research integrity. In 2021, CEDARS survey data comprised 12,594 responses from staff working in 48 Institutions. Of these, 10% were 'postgraduate researchers,' 27% were 'research staff,' 29% 'established researchers' and 26% 'senior researchers.' Others included entry-level researchers, technicians and professional staff. In 2023, survey data comprised 9,351 responses from research staff working in 66 Institutions. Of these, 3% were 'postgraduate researchers,' 27% were 'research staff,' 35% 'mid-career staff' and 29% 'senior staff.' Others included entry-level researchers, technicians and professional staff.

The Integrity in Practice Toolkit

First developed in 2018, the Integrity in Practice Toolkit,[19] produced by the Royal Society and UKRIO, continues to provide useful examples of practical initiatives for supporting research integrity and research culture, from around the world. This is an early example of the UK leading the way in this area, with a clear recognition of the interconnectedness of research integrity and research culture.

Rigour

What does rigour mean in the context of research integrity?

Rigour means carrying out research, drawing conclusions and communicating results in line with agreed norms, standards and protocols. It applies to all disciplines and parts of the research system.

What constitutes rigour is often discipline-specific: it applies both to research based on quantitative data and research based on qualitative methods. In both cases, the rigour with which research is carried out is central to its integrity, justifying the trust that is required for research results to be used and taken forward. Research that is undertaken with insufficient rigour is research that is poor quality and possibly misleading, wasting effort and finite resources.

Responsibility for rigour is wide-ranging. As well as individual researchers and research-performing organisations, professional bodies and learned societies (including the national academies) also have a stake in sharing best practice on standards and raising awareness. Examples of their work include the Royal Society's emphasis on education and skills,[20] the Royal Society of Biology's technical skills certificate training programme,[21] and the training for researchers[22] offered by the National Institute for Health and Care Research.

Rigour requires researchers to be skilled in the methodologies that they use, which may change over time, and to have access to ongoing training and support (for example, being able to use traceably calibrated instrumentation, as appropriate). Rigour does not equate to rigidity or simple rule-following but requires flexibility and a robust and nuanced understanding of research methodologies.

For organisations that have signed up to it, the Concordat to Support the Career Development of Researchers includes commitments that relate to training and support for rigour, as does the Technician Commitment,[23] which relates to technicians working in HEIs and beyond. Other initiatives aimed at enhancing rigour include the UK Reproducibility Network developing resources[24] designed to improve training in this area.

Research integrity and reproducibility

'Reproducibility,' together with the related terms 'replication' and 'repeatability,' has a range of meanings that vary by discipline and field. The idea of reproducibility generally applies in the Natural Sciences but not in the Arts and Humanities, where transparency is a more important concept. For example, transparency can relate to a researcher disclosing their position and stance in relation to their research participants, sharing the methodological approach that they have applied, or sharing research outputs in a nuanced way.

As The Turing Way[25] handbook for researchers and data scientists makes clear, there are differences between the concepts of research being 'reproducible' and being 'replicable:' reproducible meaning achieving the same results with the same data, replicable meaning achieving the same results with different data, but following the same research method. In some disciplines however, the terms can be used interchangeably.

Rigour: the current state of UK research

Definitions of rigour vary within and between fields and disciplines: there is no single measure of the rigour of UK research.

To uphold rigour in UK research, organisations within the research system provide training in research methodologies. This has expanded in the last decade to directly address research integrity, with Wellcome, Cancer Research UK and UKRI devoting more resources to graduate training on research integrity, alongside membership bodies such as the Royal Statistical Society and the Alliance for Data Science Professionals.

Data management is another important aspect of research rigour. Initiatives in this area, designed to improve the way in which research data is collected, managed, stored and deposited, include UKRI's support of the UK Data Service, and DMPonline, a web-based tool for researchers.

Rigour relates closely to other aspects of research integrity. For example, rigour can be undermined by misconduct (see the work of the Committee's dedicated working group on misconduct, below), as well as by a range of questionable research practices (QRPs).[26]

Over the past few years, some research publishers have been dedicating resources to bolstering the rigour of research outputs, addressing various stages of the publication process from initial submissions through to post-publication assessments. This has included establishing control systems and correcting the research record. While retractions continue to represent a tiny proportion of all the research published, 2023 saw the highest number of retractions on record (see page 20). Such retractions can be seen as a positive step. One area of emergent concern in relation to research misconduct in recent years, is that editorial and publishing models adopted by some publishers provide insufficient assurance of the quality of publications ahead of publication. There have been high-profile cases in which publishers have retracted large numbers of papers that were found to be the product of paper mills (businesses that generate bogus publications). While there is little evidence that these issues arise from UK research, it is important that publishers have approaches in place that support integrity, as the activities of paper mills still have a negative impact on trust in research internationally, and on the reputations of publishers themselves.

Some stakeholders across the sector are working together to address the emerging challenge of paper mills.[27] Publishers have become more assertive in publishing retractions.[28] They also work to enhance transparency in reporting methods and materials by encouraging researchers to adapt open research practices.[29, 30] To tackle plagiarism, many publishers have adopted plagiarism detection software for submissions. Image manipulation issues are being addressed through the development of image screening systems that identify duplications and other manipulations.

Alongside these technical measures, some research publishers have established teams of integrity experts to advise on how to prevent integrity problems and to resolve integrity cases more effectively. Publishers are also working to define and develop best practice, engaging with organisations such as the Committee on Publication Ethics (COPE), and investing in training to increase understanding of integrity policies, and compliance with them, throughout the editorial network.

Awareness of the Concordat

Analysis of CEDARS survey data shows broad consistency between the 2021 and 2023 surveys in the number of respondents who have some understanding of the Concordat (23%), and who know that the Concordat exists even if they do not know it in detail (30% and 33% respectively).

These figures need to be treated with caution, however, as the institutions and individuals taking part in the 2021 and 2023 surveys are not identical.

Transparency and open communication

What does transparency and open communication mean in the context of research integrity?

Transparency and open communication apply to every stage of the research lifecycle, from being clear about how research is planned and carried out, to declaring any potential (actual or perceived) competing interests to making research outputs as widely available as possible to other researchers and the public. This can include publishing or otherwise sharing negative or null results, which are valuable in their own right and valuable to the research process. Beyond publishing, there are many other ways in which researchers share and disseminate their research outputs, including depositing data, registering artefacts, sharing code, sharing protocols, registering research materials, making available pre-registered reports, and organising exhibitions and events.

The underlying principle of transparency is 'as open as possible, as closed as necessary' (H2020 Program Guidelines on FAIR Data).[31] Transparency does not mean asking researchers or organisations to forfeit their intellectual property, to lose competitive advantage, or to disclose information about identifiable individuals. Neither does it mean information being shared at every stage in the research lifecycle. Other legitimate reasons for not sharing research outputs may include legal and ethical obligations, commercial confidentiality and security considerations. While individual researchers have a responsibility to be clear and open about their reasons for not sharing data, it is also important that research-performing organisations, funders and publishers require, reward and recognise transparency, and enable transparency by providing the relevant technical support and infrastructure.

Transparency: the current state of UK research

It is difficult to assess the degree of transparency in UK research around real or potential conflicts of interest. However, we know of requirements that are in place in this area. Members of COPE, for example, are obliged to investigate cases in which editors, authors or reviewers fail to disclose competing interests.[32] Conflicts of interest can take many forms: the Concordat recognises the failure to declare them as an example of research misconduct. Reporting of research misconduct is itself a subject to which transparency can apply.

Evidence is more widely available in relation to transparency and openness in peer review, research data and research outputs. For example, 62% of UK respondents to the 2021 International Survey on Research Integrity (IRIS) thought that their organisation encouraged open access and clarity in public engagement through their research communication.[33]

The 2021 Research Excellence Framework brought in new requirements[34] around journal articles and conference papers being open access. This has encouraged HEIs to work to promote open access, to upskill and inform researchers, and to create appropriate systems and processes to support it. Open access can however, present expectations in relation to outputs, which are challenging for the Arts and Humanities disciplines, where journal articles are not the dominant form of research dissemination. Open access journal articles also tend not to be the main form of dissemination in settings outside of HEIs, including in government and industry.

Research organisations, funders and publishers continue to demonstrate a strong commitment to open access publishing. For instance, the National Institute for Health Research (NIHR) revised its open access policy for articles submitted from June 2022, and UKRI expanded its open access policy in 2024 to include monographs, book chapters and edited collections.

The FAIR data principles

The FAIR principles[35] for scientific data management and stewardship provide guidelines to help improve the Findability, Accessibility, Interoperability and Reuse of digital research assets. Resources are available to help researchers apply the FAIR principles.[36]

In 2023 the UK Reproducibility Network developed open research indicators,[37] which are currently being piloted at some UK universities. The aim is to provide insight into the effectiveness of efforts to increase take-up of open research practices, including FAIR data, the use of data availability statements and use of the CRedIT (a taxonomy for authorship roles).

Honesty

What does honesty mean in the context of research integrity?

Research-performing organisations have an important role to play in supporting researchers in carrying out research honestly and reporting it truthfully. The research system has strong oversight mechanisms in place, and alongside these mechanisms members of the research community are trusted to carry out research to high standards of integrity, which means that honesty is expected and required. Though honesty is generally associated with individuals, it is nevertheless possible for organisations to support honesty in research, for example by acknowledging that errors may happen and that their correction is supported. Organisations can further support researchers with the relevant infrastructure for the transparent recording of workflows, such as electronic lab notebooks in STEM subjects, helping to ensure that honest mistakes can be discovered easily.

Understanding of honesty, and the way in which honesty is practised, can vary across the research sector: for example, some fields in the Social Sciences and Arts and Humanities see the declaration of researchers' professional, personal or philosophical standpoints as an important aspect of honesty in research, as stance informs the way in which research is carried out, from design to interpretation.

As applied to research, honesty can include being open in:

- presenting the goals, intentions and outputs of research
- seeking ethical approval for research
- reporting on research methods and procedures
- gathering data
- engaging with study participants
- acknowledging the importance of null or negative results
- basing narratives on research outputs, not selecting research outputs to support a narrative
- using and acknowledging the work of other researchers, research stakeholders and co-producers
- making valid interpretations and justifiable claims based on research, and
- communicating research outputs.

Research organisations can choose to put in place systems that support honesty, and to identify and change those that do not. This can include creating a culture of open discussion and learning, partly by providing training and professional development (especially but not exclusively for research team leaders, who play an important role in creating open team cultures). Equally important are having a whistleblowing policy that makes people feel safe in raising issues and putting in place procedures to support the honest discussion of biases, influences and interests. Support for honesty also means having appropriate procedures in place for reporting and dealing with allegations of research misconduct.

Analysis of CEDARS survey data shows an increase between the 2021 and 2023 surveys in the percentage of respondents who say they have received training in research integrity (41% to 47%).

These figures need to be treated with caution, however, as the institutions and individuals taking part in the 2021 and 2023 surveys are not identical.

Honesty: the current state of UK research

Retractions of papers from research publications can be a key indication of a well-functioning research system, addressing honest errors, poor practice, and intentional research misconduct.

We commissioned work to analyse retraction trends, using the latest data in the Retraction Watch Database,[38] which is now freely available online. For the analysis, UK publications are defined as those that have one or more co-authors with a UK affiliation in the author list. For a comparative reference point 2017 has been used, as it marked the first year that found instances of new reasons for retraction.

Global trends

Globally, the number of published academic papers is increasing each year and so is the proportion of those papers retracted within two years of publication. In the UK, retraction rates are at under 0.05% of published papers, and UK retractions have remained in proportion to the increase in the number of publications since around 2013. The scale and trend of UK retractions is similar to those of countries in the Organisation for Economic Cooperation and Development (OECD).

Using reasons for retraction as recorded on the Retraction Watch database, we examined papers published since 2017 in the UK and retracted within two years of publication (407 in total). The most common reasons for retraction relate to paper content. These include 'concerns/ issues about data' (71 retractions), 'unreliable results' (54), and 'concerns/ issues about results' (46). Retractions are often identified by investigation, including 'by the journal/ publisher' (75) and 'by a third party' (33).

Recent UK themes

Several reasons for retraction were only recorded in Retraction Watch's database since 2017. For UK papers, these include paper mills (14 retractions – for more on paper mills see page 35), although this is currently a small proportion of the total retractions (4%) and not in the top 10 reasons for retraction. Other reasons include 'concerns/ issues with peer review' (24 retractions), 'fake peer review' (23 retractions) and 'randomly generated content' (15 retractions). These recently recorded reasons may warrant closer attention in the future.

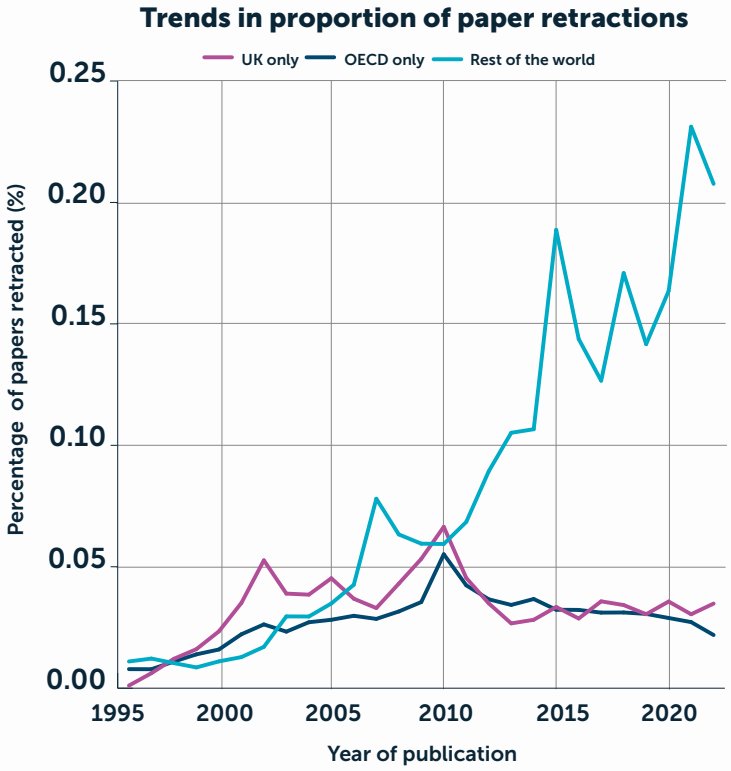
Reasons for retraction of UK papers with the biggest observed increase are 'concerns/ issues about references/ attributions' (increasing from 3% of retractions before 2017 to 9% since 2017) and 'conflict of interest' (up from 1.5% before 2017 to 5% since 2017). Our denominator data was sourced from Scimago Journal & Country Rank (SJR).

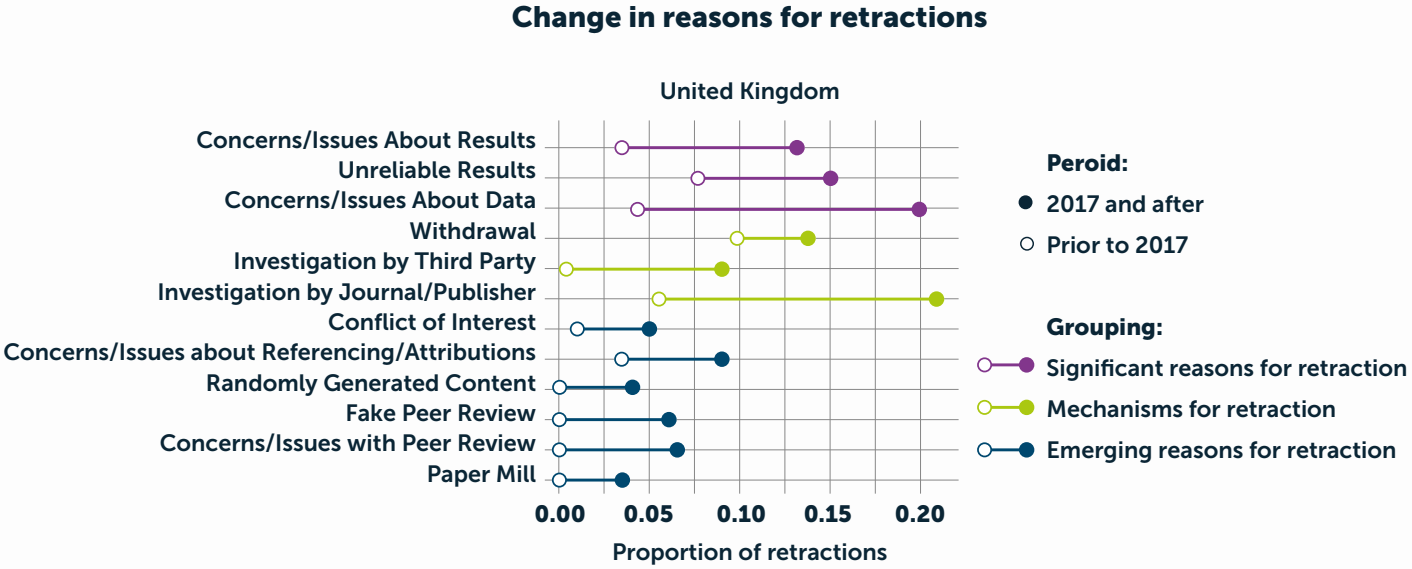
What do retractions tell us?

Retractions depend upon the parties involved, such as publishers, editors, and authors, being willing to publish a retraction. Our analysis provides no indication of the numbers of publications that should be retracted but have yet to be.

Retractions are not a direct measure of research misconduct. Retractions are one tool for correcting the research record and may be necessary due to honest errors or progress in knowledge. Given the increase in volume of papers, recent changes to recording of reasons for retraction, and new themes emerging, the community needs to maintain vigilance.

We will continue to monitor the situation.





Top figure: A line chart showing UK and OECD retraction rates, aggregated by year of publication between 1995 and 2023. The chart shows a line for the UK, the OECD and the Rest of the world. The total number of papers published is divided by the number of papers retracted. To examine recent changes in retraction rates, only papers retracted within two years are considered, with final year of publication considered 2022.

Bottom figure: A dumbbell chart showing the currently important reasons for retraction. The reason listed are: Concerns/Issues About Results, Unreliable Results, Concerns/Issues About Data, Withdrawal, Investigation by Third Party, Investigation by Journal/Publisher, Conflict of Interest, Concerns/Issues about Referencing/Attributions , Randomly Generated Content, Fake Peer Review, Concerns/Issues with Peer Review, Paper Mill.

The dumbbells are plotted over the proportion of retractions citing those reasons with a range 0.00 to 0.02. Changes in the reason for retractions, examining two periods: publications prior to 2017 and publications since 2017. Colours represent significant (i.e. most common) reasons for retraction, mechanisms for retraction, and emerging reasons for retraction. For comparability, only papers retracted within two years were considered.

Care and respect

What does care and respect mean in the context of research integrity?

Care and respect apply to the participants in research, as well as to the users and beneficiaries of that research. Care and respect must apply to animals that are involved in research, as well as to people. The environment, cultural and historic artefacts, and the research record also need to be treated with care and respect.

There is also a need for researchers to demonstrate care and respect for their colleagues and collaborators, and for funders and employers to show care and respect for researchers. This principle underpins the development of a research culture that supports equity, diversity and inclusion. Such a culture creates an environment in which research integrity can flourish, because it ensures that researchers are recognised for their broad contribution to the research enterprise. This requires organisations to consider how to appoint, promote and retain people, and the incentives that they use in order to foster high-quality research which is carried out with integrity.

Care and respect: the current state of UK research

In our 2023 statement we reported that in the 2021 IRIS survey, 75% of UK respondents said that their own organisation's ethics policies were effective, and 67% believed that their organisation closely resembled one in which there are good standards of ethical review.[39] This compares with 51% of US respondents, and 42% in the EU.

There is extensive ongoing work across the sector that addresses care and respect for others in the research system. One example is the Forum for Tackling Bullying and Harassment in Research and Innovation, which represents a commitment from funding, policy and regulatory organisations in the UK.

In the UK, care and respect for research participants takes place through a number of means. These include close scrutiny of the ethical conduct of research, especially in sensitive areas: research involving human participants or animals, for example, is tightly regulated. Many HEI research ethics committees operate with clear guidelines. The Home Office publishes reviews and statistics on animal research, and the Health Research Authority provides oversight of research in health and social care. There are a number of UK organisations that collect and publish information about research, working to improve its ethical quality, including NC3Rs, AllTrials and the James Lind Alliance. The ARRIVE Guidelines[40] also support transparency in reporting animal research.

Initiatives to support diversity, equity and inclusion in research careers also seek to promote care and respect for everyone carrying out research. There are many ongoing examples of work across the UK research sector that address these issues, including the Athena SWAN[41] and Race Equality Charters.[42] UKRI's Future Leaders Fellows Development Network also works to increase access to research careers, and to foster a positive research culture through selection and training of the next generation of research leaders. Sector-specific initiatives relating to research careers include Equality, Diversity and Inclusion in Science and Health[43] (EDIS), the Royal Society of Chemistry's Inclusion and Diversity Fund,[44] and Project Juno,[45] supported by the Institute of Physics.

In terms of care and respect for the environment, funders are acting to support environmental sustainability. In 2024 the Concordat for the Environmental Sustainability of Research and Innovation Practice[46] was launched. Wellcome has also launched a new environmental sustainability policy[47] that requires lab-based researchers to achieve accreditation to sustainability schemes such as the Laboratory Efficiency Assessment Framework[48] (LEAF) programme. UKRI now also requires all applicants for funding to address the Responsible Research and Innovation[49] (RRI) framework, on ways of carrying out research that is socially responsible, that considers and supports environmental sustainability, and that is ethical.

While this annual statement was being written, the World Conference on Research Integrity (held in 2024 in Athens, Greece) announced that the theme for the forthcoming 2026 meeting in Vancouver, Canada will include aspects of indigenous participation in research. This builds on the Conference's Cape Town Statement[50] on Fostering Research Integrity through Fairness and Equity, published in 2023.

LEAF

The Laboratory Efficiency Assessment Framework (LEAF) programme aims to improve the sustainability and efficiency of laboratories, providing them with Bronze, Silver or Gold awards depending on the sustainability actions that they take. Laboratory-based research consumes large amounts of energy and other resources. Over eighty research organisations have so far joined the LEAF programme, working together to reduce their carbon emissions.

Accountability

What does accountability mean in the context of research integrity?

In a research context, accountability includes the collective responsibility that funders, employers and researchers themselves have, to create a research environment in which individuals and organisations are empowered and are able to own the research process.

When an individual researcher, research group or research organisation is accountable, they are expected to document how they have met their responsibilities and be assessed on their record in this respect. Specifically, they can be held to account when their behaviour falls short of the expectations set out in the Concordat.

Accountability: the current state of UK research

Accountability requires clear governance. For members of the research community to be accountable, it is important that they know who is responsible for what and to whom, especially in work that crosses organisational boundaries. For instance, in research publishing, different responsibilities sit with editors, peer reviewers, authors, publishers and employing institutions. Similarly in health and social care research, the UK Policy Framework for Health and Social Care Research[51] clearly outlines the responsibilities of chief investigators, research teams, funders, sponsors and research organisations in research governance.

Across much of the rest of the UK research landscape, the picture in relation to accountability is a complex one. Individual researchers may be accountable for their work to various organisations, including funders. Particular researchers (such as those who carry out research involving animals[52]) have additional accountabilities.

An important aspect of accountability is the responsibility that employers and researchers themselves have, to create a research environment in which individuals and organisations are empowered in upholding research integrity. Training is an essential part of this.

Analysis of CEDARS survey data for 2021 and 2023 indicates that 41% of respondents said that they would like to undertake training or other professional development in research integrity. Where training is provided, we encourage organisations to assess its impact on practices related to integrity. These figures need to be treated with caution, however, as the institutions and individuals taking part in the 2021 and 2023 surveys are not identical.

Revisions to the Concordat to Support Research Integrity

The co-chairs of the Committee have been invited to chair the 2024 review of the Concordat to Support Research Integrity. The review aims to ensure that the Concordat continues to be effective in supporting UK research integrity, reflects recent developments in research nationally and internationally, is aligned with international frameworks, and is useful and practical. The review is being carried out by the Research Integrity Concordat Signatories (RICS) and will be completed by the end of 2024.

Spotlights on research integrity indicators, misconduct and AI

In this section we highlight three key areas relating to research integrity in which there has been significant activity over the last year. Many organisations have been involved in thinking about these areas. Given their importance, the Committee has working groups dedicated to each of these.

Indicators of research integrity: new directions

The UK Concordat to Support Research Integrity has established high-level principles of research integrity which are used across the research system, but at present there is no agreed framework to assess how – or the extent to which – these principles are applied in practice.

There is a growing sense, both in the UK and internationally, that research integrity would benefit from an evaluation mechanism to provide a detailed picture of current initiatives and of changes over time.

What do we mean by indicators of research integrity?

We define an indicator as a quantitative or qualitative factor, aspect or variable that provides a reliable means to evaluate achievement, to identify the presence and scale of any changes connected to an intervention, or to help assess the status of a system.

The Committee's role in this area

One of the Committee's early contributions was as part of a joint response[53] to 'Indicators of research integrity – an initial exploration of the landscape, opportunities and challenges,' a Research Consulting report published in July 2022.[54] This work was commissioned by Cancer Research UK, GuildHE and UKRI to bridge the gap between what they felt was currently understood about misconduct and what the system needed to know about integrity in the UK.

Recognising the growing interest in measuring progress, the Committee developed a work stream to explore indicators that research organisations might use to evaluate and improve their own approaches to research integrity, helping them to set priorities and plan their future strategies and activities. Our work on indicators has focused on HEIs in the first instance and reflects incentives and challenges across the HEI sector. In such a setting, indicators might be used to gather valuable information about research integrity: not for ranking, but to monitor the state of UK research integrity over time, highlight good practice and show where improvements might be made.

Through discussion forums, we have listened to the views of stakeholders and experts on existing and potential indicators. As we have done so, we have considered potential benefits alongside challenges, potential risks and unintended consequences that may be involved in adoption of indicators relating to research integrity.

A set of indicators would need, for example, to recognise the diversity of the research system. It would need to be widely seen as useful, valid, and otherwise acceptable across a range of HEIs. The indicators would need to support the collection of information in an ethical way (including with regard to privacy) and they would need to be transparent.

We are aware of potential concerns of research integrity indicators not measuring exactly the same things, given institutional autonomy and uniqueness, and of indicators potentially being used to undermine rather than support efforts to promote integrity. We are also aware of the need not to burden HEIs with unnecessary tasks, especially when many are working with restricted resources.

Working collaboratively

Working with, and being informed by, diverse perspectives is an important aspect of the Committee's activity. For this workstream, we established an external advisory group to provide insight and challenge, to ensure that what we set out to do would be beneficial for UK HEIs.

We started by identifying seven broad domains in which HEIs have responsibility for research integrity: leadership, investment, strategy, procedures, practices, skills and research culture.

Following discussions with stakeholders, two domains (investment and research culture) were removed, as they operate across all domains or are a consequence of HEIs meeting their research integrity responsibilities. In this process, we used the five-stage SCOPE framework[55] for responsible research evaluation to guide stakeholder discussions and subsequent work.

We then held three in-person and two virtual workshops between October 2023 – March 2024 in which we engaged with over 100 colleagues from across the research system. This helped us to identify areas of responsibility that HEIs have for research integrity, and to break these areas down into specific activities for which evidence could be gathered. We then explored the consequences of using the evidence discussed as potential indicators of research integrity.

Current and emerging initiatives

A number of other national and international projects are underway, which are relevant to our work on research integrity indicators. We will provide more detail about these in our forthcoming report on indicators, but want to draw attention to three key initiatives that are generating complementary insights.

The UK Reproducibility Network (UKRN), together with the non-profit open-access publisher PLOS, is working on an Open Research Indicators Project which aims to establish ways in which institutions can monitor open research, for example through dashboards and reporting tools.

The UK's higher education funding bodies are currently developing indicators for the assessment of people, culture and environment (PCE) for the Research Excellence Framework (REF) 2029. We have fed, and continue to feed, into REF consultations on PCE, focusing on collected stakeholder views especially on areas that have a research integrity component or that might intersect with actions and processes related to research integrity.

Finally, the US Strategic Council for Research Excellence, Integrity, and Trust is developing a set of indicators of the trustworthiness of research, focused largely on the integrity of research outputs. It is working with research publishers to develop a framework of tools that can be used to gauge whether studies have been rigorous, properly conducted and well-reported.

Interim recommendations – research integrity indicators

In our forthcoming report we will highlight key indicators that might be of value, taking into account our stakeholder and expert discussions and viewpoints, the ability of HEIs to provide evidence relating to an indicator without unnecessarily adding to their administrative burden, and the different disciplinary perspectives shared with us.

In the meantime, we recommend that:

HEIs share evidence relating to research integrity. Many HEIs are already collecting and sharing some of this evidence in their annual statements of research integrity. Sharing evidence on research integrity indicators will be of value to HEIs, to research funders and to the wider research sector, and will help the Committee build the evidence base for improving research integrity in the UK.

We encourage others to build on our work, by refining and evaluating research integrity indicators and considering how information collected might be best described and disseminated.

Research misconduct: evidence-based approaches

When cases of research misconduct occur, the consequences can be far-ranging and serious. Misconduct impacts the individuals involved in research and can have a long-term negative impact on the trustworthiness of the research record. Members of the public may be harmed if research findings – for example on a healthcare intervention – are spurious. Uptake of the MMR vaccine fell following a 1998 publication, of a study conducted in the UK and published by a UK journal – that was subsequently shown to be fraudulent.[56]

Research misconduct is also one of the factors that could corrode the trust that a vibrant UK research economy depends on. In order to preserve that trust, it is important that any instances of misconduct are identified and dealt-with fairly and effectively, with policies and processes that are open and transparent. For this, the sector needs robust systems for investigating allegations of research misconduct, and then communicating and learning from the outcomes of those investigations.

The Committee's role in this area

The success of the UK research system depends on research outputs, and the individuals who produce those outputs being trustworthy. It is therefore important to mitigate the impact of misconduct and to address the pressures that might lead to it. Progress in this area has been slow. For this reason, the Committee has a workstream considering how to improve the evidence we have about misconduct and approaches to mitigate and resolve it, and to make recommendations about how the UK system might improve the mechanisms currently in use.

Over the past year our cross-sector working group has been learning from existing international models, and the successes and challenges that countries have experienced when they established national frameworks and bodies to manage research misconduct.

We have concentrated on HEIs, seeking to understand, through the collation of evidence, the scale of research misconduct across the HEI sector in the UK, and its implications for other parts of the research system, including through commissioned research and collaboration.

At the same time, we have been working with other organisations to improve the way that we identify, investigate, record and learn from instances of misconduct.

Working collaboratively

The Committee's cross-sector research misconduct working group brings together members of the Committee with colleagues from across the sector. It has representation of different career stages, from a university Vice-Chancellor to an early-career university researcher, but its remit goes beyond HEIs. Industry representatives, a UK Government department, the National Co-ordinating Centre for Public Engagement (NCCPE), research funders, the Research Integrity Concordat Signatories groups, the UK Research Integrity Office (UKRIO), members of international research integrity bodies and representatives of smaller research organisations are also included. This ensures the presence of wide stakeholder representation from those who commission, fund and draw on research carried out in HEIs.

What do we mean by misconduct?

Misconduct represents a serious, intentional breach of research integrity. According to the Concordat to Support Research Integrity, misconduct includes fabrication, falsification and plagiarism, failing to meet legal, ethical or professional obligations, and misrepresentation. Misconduct does not include the honest mistakes that researchers can make in their work, nor does it apply to simple disagreements over research aims and methods. Short of outright misconduct, there are also 'questionable research practices' (QRPs), such as inaccurate referencing or failing to keep accurate records of research.

Within HEIs, there are a spectrum of concerns that look different across disciplines. While the issues may differ, the policies and processes for responding to allegations of misconduct need to be consistent, transparent, robust, and based on care and respect of everyone involved in the process.

In identifying research misconduct as an important area of focus, the House of Commons Science and Technology Select Committee in its 2018 report on research integrity was responding to concerns about the threat that misconduct might pose to the UK research system.[57] This report was the impetus for setting up the UK Committee on Research Integrity. In 2023, the Select Committee published another report[58] on reproducibility and research integrity, reflecting a continued concern about the integrity of the research system.

Although the workstream is not focusing on bullying or harassment, allegations of misconduct sometimes give rise to allegations of such behaviour. Institutions and funders will have specific policies and processes focused on bullying and harassment, and funders will have expectations about how HEIs address allegations.

The extent of the problem: evidence of misconduct

There are different perspectives across the research system about the prevalence of research misconduct in the UK. Working to improve the evidence base on misconduct is one of the Committee's main priorities. In 2023, the Committee worked jointly with the signatories of the Concordat to commission an analysis of the annual statements on research integrity that were produced by UK HEIs between 2019 and 2022.[59] 60% of statements were found to have reported at least one allegation of misconduct, and 28% stated that an allegation was upheld at least in part. The most common form of alleged misconduct was plagiarism, followed by failure to meet legal, ethical or professional standards, and misrepresentation.

Rates of retractions (where research papers are withdrawn – see analysis above) are another source of data on misconduct. However, papers may be retracted many years after they were published, and this can happen for reasons that do not relate to misconduct (for example due to honest error or because of problems with research materials).

Improved reporting on misconduct

The Concordat establishes the expectation that research organisations will produce and publish annual statements on research integrity. These should include information on the number of allegations of misconduct that have been formally investigated, and the outcomes of those investigations. The signatories of the Concordat, which includes university representative bodies and funders, expect their members and those they fund, respectively, to fulfil this commitment.

Annual statements provide important data on integrity and misconduct. The results of our 2023 analysis of HEI annual statements, suggested a variety of approaches to the way that research organisations currently investigate allegations, making it harder to assess the sector as a whole. Acknowledging the potential burden on research organisations to write annual statements, the Concordat signatories commissioned UKRIO to develop an annual statement template. The template seeks to make reporting easier for research organisations and to provide a better evidence base for sector wide analysis in the future. This is still in a pilot phase, including evaluation of the template's usefulness, but is expected to help to generate more consistent data.

However, reporting is not the only issue. Institutions' guidance in this area is varied, reflecting the varying size and nature of organisations.

UKRIO has published a report[60] on the barriers that currently exist in research organisations' systems for dealing with misconduct, suggesting practical steps to overcome them. We have been working closely with UKRIO in this area, sharing evidence as well as preliminary and evolving findings.

Analysis of CEDARS survey data, shows that in 2023 8% of survey respondents said that they had personally felt pressured into compromising their research standards or integrity, but only 4% had reported any incidents of research misconduct.

Early career researchers were the least likely both to feel pressured (7%) and to report incidents of misconduct (2%).

Information-sharing around allegations

Research misconduct is an area in which there are sensitivities around disclosure. It can be difficult to find the right balance in sharing information on investigations into alleged research misconduct, and what subsequently happens to that information. It is important to respect an individual's right to anonymity, and ongoing investigations can be compromised especially by public disclosure and debate taking place in public, such as on social media. Further guidance is needed for research organisations in these situations.

Wellcome, together with UKRI, the Universities and Colleges Employers Association, UKRIO and the Association of Medical Research Charities, and with advice from the Information Commissioner's Office (ICO), has been working to provide guidance on how organisations can make informed decisions on data-sharing (either around instances of research misconduct, or of bullying or harassment). The ICO has advised that some information-sharing related to research misconduct is permitted by the General Data Protection Regulation under the right governance.[61]

A national body to provide oversight?

In the UK, autonomous research organisations are free to carry out investigations of alleged research misconduct following their own guidelines. In some countries (including the US, Canada and Australia) there are national bodies that oversee investigations of research misconduct, and/ or can hear appeals. In some cases, the investigations of these national bodies are supported by laws that limit definitions of research misconduct to falsification, fabrication and plagiarism.

Through our links with research integrity bodies around the world, we have been able to share information that maps different models of oversight in a number of countries. A review[62] commissioned from KPMG by the National Health and Medical Research Council in Australia, for example, described nine models from outside of Australia (including the UK).

Building on the report produced by KPMG, the Committee aims to learn about and evidence the effect and/ or efficacy of various national models, understanding more comprehensively their impact on the research integrity system, as well as their implications for resource.

Developing skills

Finally, through our initial scoping work the importance of skills development has emerged as an important topic. The people who are involved in handling allegations of misconduct need to have the necessary training to do so, but research organisations vary considerably in what they provide. This is an area where better guidance is needed, regarding the competencies required, and the best way of equipping individuals with them. Based on their recent report[63] into how investigations into research misconduct are handled, UKRIO have recommended that training be implemented for those undertaking such investigations.

Interim recommendations – misconduct

We will make our full set of recommendations in 2025, based on an enhanced evidence base. For the time being we recommend that:

- research funders encourage all research-performing organisations (whether they are single- or multi-faculty, HEIs or independent research organisations) to publish annual statements, and to ensure that these provide clear information about the incidence of allegations of research misconduct and a summary of the outcomes of investigations
- research funders align what they ask organisations to report, and when, in relation to research misconduct (to reduce the bureaucratic burden)
- research organisations are transparent regarding the actions that they subsequently take when allegations of misconduct are upheld: this helps research organisations to learn from occurrences of misconduct and prevent them from happening again
- the annual statements of research integrity produced by UK Government departments be made more wide-ranging and adapted to the nature of the research undertaken in them, ensuring robust reporting of cases of misconduct: we will work with GO-Science to help encourage this
- research organisations give greater consideration to the impact of social media on misconduct investigations. How investigations are managed when key information circulates in the public domain can compromise anonymity and in some cases the integrity of the investigation process

Artificial Intelligence: its implications for research integrity

AI has the potential to deliver huge benefits for research and innovation, whilst also challenging existing practices and methods that support the trustworthiness and integrity of research. The UK has demonstrated leadership in this area, through the launch of the AI Safety Institute and the Bletchley Park AI Safety Summit (November 2023). However, to safeguard the UK's world-class research system, the sector will need relevant standards and policies to demonstrate the trustworthiness of research that uses AI.

The Committee's role in this area

While funders, publishers, research organisations and discipline-specific bodies are responding to the opportunities and challenges posed by generative AI, significant attention has not yet been given to the impact of this technology on research integrity. The Committee has a formal responsibility to promote research integrity in the UK, which includes promoting integrity and trustworthiness in the use of emerging technologies, across all types of research environments. Given the fast pace of change that has taken place as a result of the increased availability of generative AI, the Committee has developed an additional, dedicated work stream looking at this issue, and how the risks of AI can be balanced with its benefits.

We aim to support research integrity, including helping to raise awareness and providing greater consistency across the research landscape, by convening stakeholders who have a role in supporting the sector's adoption of innovative AI.

The Committee has an interest in understanding how research integrity is being challenged, and possibly also supported by generative AI, and how the research community is responding. There are questions regarding:

- the risks and opportunities that emerging technologies bring in relation to research integrity
- appropriate mitigations
- who should be developing policies and guidelines across the sector
- whether there are any gaps in provision

In activities concerning the safety or regulation of AI, the Committee aims to keep research integrity central to the agenda.

Working collaboratively

Between January and June 2024, we engaged with stakeholders from across the research system to discuss the implications for research integrity of the emergence of generative AI. We have sought disciplinary breadth and experience, encouraging discussion about the implications for research integrity based on the use of AI in research taking place in a variety of environments. We have held bilateral discussions with individuals and organisations from across sectors to formulate the next phase of discussion, iterating where we could most add value.

Artificial Intelligence and research integrity: recent developments and risks

Forms of Artificial Intelligence (AI) have been used within the research system for years. The research sector was able to stress-test early AI tools against integrity concepts, and it will continue to do so with emerging AI tools.

Recent developments have resulted in the widespread use of generative AI tools and models, as well as vast amounts of data from a huge range of sources. The implications of this for research integrity need to be understood: there is a need to develop norms to assess appropriate use of AI-generated datasets and to encourage transparency, both by researchers themselves and by all those with an interest in research.

Researchers are responsible for the outputs of their research. Therefore, researchers need the awareness and skills to understand and be accountable for the potential 'black box' that they are introducing into their research through the use of generative AI.

Ethical use of AI tools might also involve environmental considerations, given the large amounts of energy use that it involves.

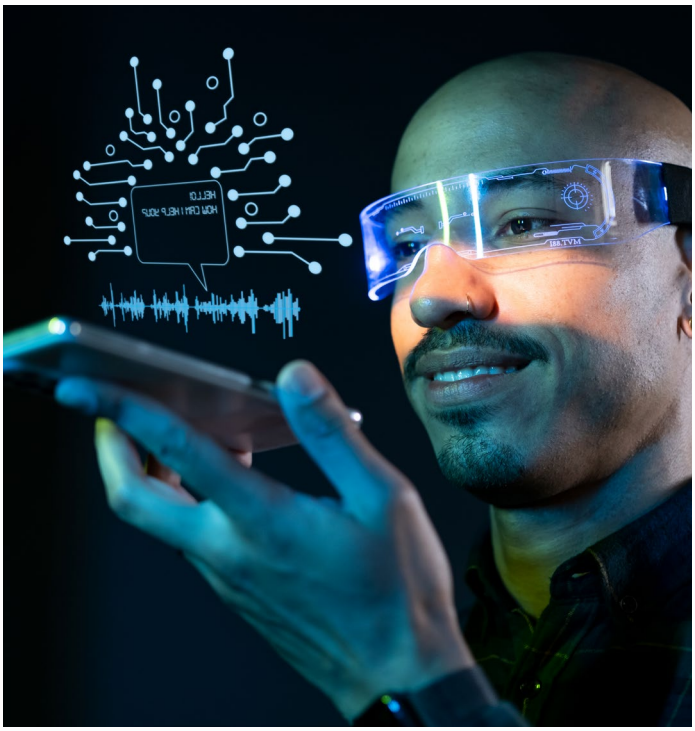
Policies and practices regarding generative AI are emerging across the research system, but these are not always consistent or easy to navigate, and there are gaps in provision. In other sectors of the economy, investment is available to develop AI applications and safeguards. The research sector would benefit from a similar focus to support research that engages with AI, recognising the importance of both technical and non-technical questions (including those relating to governance, integrity and public understanding).

AI, bias and research integrity

Bias in AI is well documented, with sources of possible bias being present at each step in the process of developing and using an AI tool. The consequences can be serious: in healthcare for example, bias in data sets has the potential to have far-reaching consequences for health outcomes.[64]

To help researchers be accountable, they need to understand the implications of using large AI-generated datasets, and how to prompt large language models without introducing bias themselves. Transparency and standardisation in describing what data a tool is trained on, and assessments of statistical power across data attributes, can support researchers in avoiding bias.

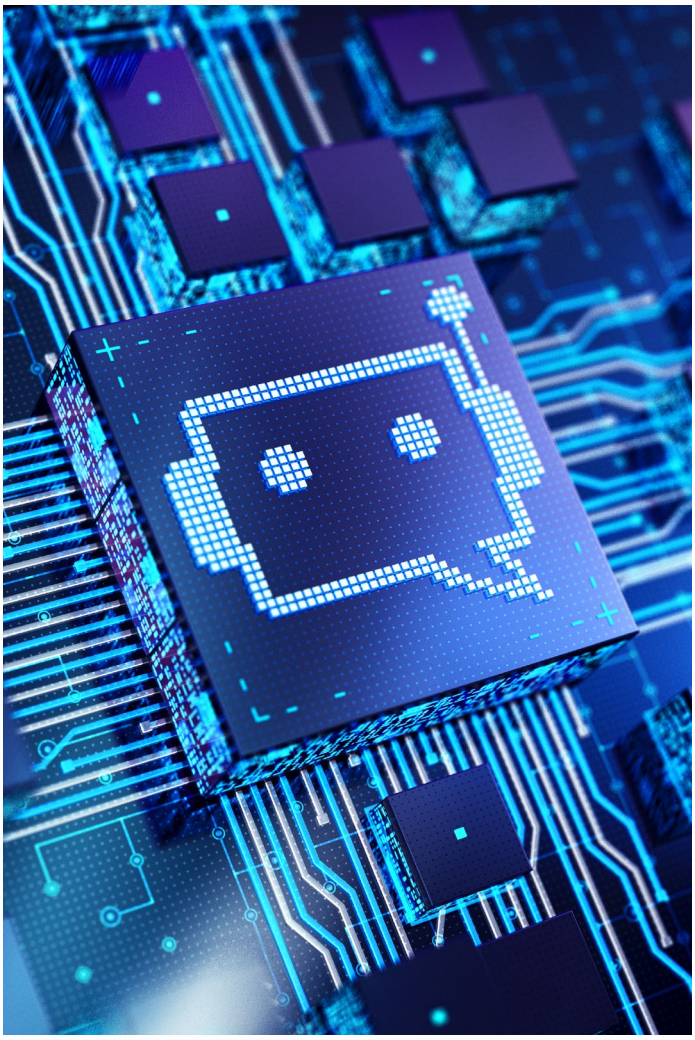
As well as being used for research itself, the use of AI in developing research ideas, in writing research funding proposals, and in peer review of research papers, is problematic if not carried out in a transparent way.



Paper mills

Whilst use of AI can be a means of detecting plagiarism or use of generative AI in papers, it can also be a tool used by so-called paper mills – bogus publications that have increasingly been found in the research record. Paper mills undermine trust in research and have infiltrated the research literature in some fields.[65]

According to our analysis of retractions data (see above), paper mills are not in the top 10 most cited reasons for retraction of papers with any UK authors. Nevertheless, paper mills present an emerging challenge for the global research community to address in order to safeguard confidence in published literature.



Who leads in responding to AI?

The development and use of AI is a particularly fast-moving subject. In the UK leadership on its implications for research is distributed, with a range of different types of stakeholders all having influence.

Because of the pace of change in this area, there is a case for a single body to co-ordinate and lead discussions around the challenges and opportunities that AI brings with it in relation to research. In this we need to work across disciplines and sectors, as well as across national borders, to ensure that our response to AI is relevant and robust. The Royal Society's recent report[66] on science in the age of AI makes some helpful recommendations in this area, as did a workshop discussion[67] that the Royal Society recently hosted, exploring proposals for new institutional functions related to international governance of AI.

The question of whether there should be a regulator for AI (and even what regulation might mean in this context) is an evolving issue, with both the EU and US developing specific legislation in this area. We have been following these developments closely.

Though at present there are legislative restrictions on the use of AI (including the Data Protection Act 2018, Equality Act 2010 and the Copyright, Designs and Patent Act 1988), there is no regulator in the UK for AI. In both the AI regulation White Paper and the Science, Innovation and Technology Select Committee's 2023 inquiry on the governance of AI,[68] the Government gave no indication that it intends to create legislation for AI at this stage.

A related challenge regarding use of AI is the need for standard-setting and clear lines of accountability. If research has involved AI, what should a user of that research be able to expect regarding the way that AI has been used?

Currently there is a gap in the accountability architecture regarding use of AI in research. Research funders have a role in this, which should start with their having consistent expectations of research institutions. A body might be required which can apply the same standards both to publicly funded and privately funded research. Again, this is an area in which greater and clearer leadership is needed.

Current and emerging initiatives

Funders have published a joint statement[69] on their expectations of recipients of research funding in relation to AI. As yet, however, use of AI tends not to be mentioned in the terms and conditions of funding.

In November 2023, the Government published its response to the independent review of the UK's research, development, and innovation organisational landscape. This included a £10m commitment from the Department for Science, Innovation & Technology (DSIT) for the establishment of a Metascience unit, jointly run by DSIT and UKRI. The Metascience Unit supports cross-cutting research aimed at finding better ways of carrying out research and development, including through the use of AI. Early activity includes the Metascience grants programme,[70] launched by UKRI in April 2024, which will fund cutting-edge research into more effective ways of conducting and supporting research and development.

International initiatives

Due to the fast pace of change and growth related to the use of generative AI, we are paying close attention to developments internationally, and are incorporating these into our thinking. Of particular interest to the Committee is the draft of a code of conduct on use of AI in health, healthcare and biomedical science, published by the National Academy of Medicine in the USA. The US National Academy of Sciences, the Annenberg Public Policy Center, and the Annenberg Foundation Trust recently convened an interdisciplinary panel of experts[71] to explore the growing challenges posed by the use of AI in research, and to chart a way forward for the scientific community. This included principles of human accountability and responsibility for scientific efforts that employ AI.

In its 2023 revised edition, the European equivalent of the Concordat, the European Code of Conduct for Research Integrity,[72] now references the European Commission's Guidelines on the Responsible Use of Generative AI in Research.[73]

Interim recommendations – emerging themes

Following broad discussions across the research sector, we have begun to identify themes which require particular attention. Instead of interim recommendations, we encourage all parts of the research system and from all research environments to consider how these areas are being addressed by their institutions. They include:

- **governance.** Is a dedicated body required to co-ordinate responses to new developments in AI that impact the research system (positively or negatively)?
- **roles and responsibilities.** Who is ultimately to be accountable for the way that AI is used in research? Is this primarily a matter for researchers themselves, or for the institutions that they work within, or the funders that support their work?
- **skills and training.** What do the people in the research system need, to make the best legal and ethical use of AI?
- **public understanding and expectations: trust and the trustworthiness of research.** Are researchers able to clearly explain their sources and methods, and the limitations of their research? Does the public have a strong understanding of the implications of AI when researchers share their outputs?
- **attribution and ownership.** What are the implications of AI for intellectual property rights, for example? How should use of AI in research be acknowledged?
- **assurance regarding methods and rigour.** How do we build confidence that research is robust when it uses AI?
- **research on research integrity.** Much research is being carried out in the development of AI tools, do we need to invest in research on the implications for integrity and trustworthiness across disciplines and throughout the research lifecycle, and what should be prioritised?

The Committee will be discussing these and other issues widely across the sector, with the aim of developing specific recommendations and observations when we publish our full report, in 2025.

Conclusion

UK research is world-leading, and research integrity underpins the quality and reputation of our research.

There is much that is positive in the UK research system, including the state of research integrity. UK research is driving economic growth and contributing to our quality of life, in ways that are not always visible or recognised.

Too often, research integrity is understood through a focus on its opposite; research misconduct. Yet the picture that we are providing, through this annual statement, includes many examples of good practice in research integrity.

Misconduct makes for easy headlines; the painstaking work to uphold and develop research integrity does not. Naturally there is room for improvement, and it is essential that we are not complacent as the high standards of research integrity in the UK depend on continued scrutiny and collaborative effort.

However, there is much good practice across the sector, and more can be done to showcase that practice and share learning and evidence. Doing so recognises success, and enables individuals and organisations to learn from each other.

The research integrity landscape is also changing (for example with the introduction of new technology, which brings new risks as well as opportunities). Organisations that carry out research, and those that publish research outputs, can do more to create environments that support research integrity.

One of the ways in which organisations can uphold and enhance research integrity is by thinking about how they assess researchers for recruitment, promotion and funding. To uphold and enhance research integrity, changes could be made in the incentive and rewards system that UK research depends upon. For example, clear promotion criteria could be introduced that acknowledge researchers' contributions to enhancing research culture, carrying out peer review, supporting open science, and providing leadership in matters of research integrity.

Against the background of a sometimes-adversarial media and social media landscape, we need to create a UK research culture in which errors can be acknowledged in productive ways, without the punitive and aggressive language that has been a feature of discourse on research integrity in recent years.

As a sector, we also need to do better at communicating the value of research integrity, and the trustworthiness of UK research. A loss of trust in research, especially among research-users and the wider public, would be highly damaging. More advocacy is needed on behalf of UK research integrity.

The way ahead

With our cross-sector remit, we can see that there are concerns about research integrity in some parts of the UK research system. Research publishers in particular have been reporting increased risks to research integrity. These are global issues that have effects in the UK, since UK researchers' work is informed by published research from around the world, UK research organisations recruit in a global jobs market, and UK researchers can be affected by a more widespread loss of public trust in research and researchers.

The Committee was founded only in 2022, but already we have begun to establish ourselves as a 'critical friend,' a resource for the sector, raising the profile of research integrity. Covering the whole of the research sector, we consult across all research fields and involve research organisations as well as HEIs, including government departments, research publishers and funders. Our work will continue to be collaborative; we are an ally of other organisations in this space, all of which have an interest in upholding and enhancing UK research integrity.

We will also continue to work to raise the profile of research integrity within the sector and beyond. Research integrity is important to everyone within the research system, as well as to research users. The research integrity landscape is both busy and complex. We are here to help, listen to and learn from research organisations, and the sector as a whole, as they attempt to navigate within that landscape.

The House of Commons Science, Innovation and Technology Select Committee asked us to provide a clearer evidence base for research integrity in the UK. We are acting on that request and will continue to do so. It is vital that conversations about research integrity are grounded in evidence. Too often discussions in the public domain are not backed-up by data, meaning that assertions are made without justification. We need to provide a more nuanced, robust, rigorous understanding of issues for research integrity.

Working with the evidence, we also need to focus more on joint accountability. Individual researchers, HEIs, research performing organisations, funders, government departments and publishers all have their discrete areas of accountability, but none is accountable for the whole. To strengthen resilience regarding integrity in the UK research system we need to show where the lines of accountability are and support collaboration to uphold our common values.

We will continue our efforts to bring funders, researchers and publishers together, to integrate the current distributed system of accountabilities, and ensure that we anticipate and respond to challenges.

In the year ahead our working groups on research integrity indicators, misconduct and AI will report on their findings. The Committee's co-chairs will also continue to chair the review of the Concordat to Support Research Integrity, so that it can continue to support UK research integrity over the coming years.

With revisions being planned to the Research Excellence Framework 2029, we continue to make the case[74] that proposed changes to the REF should be made with due consideration of their implications for research integrity, especially in the incentives (and perverse incentives) that they may create, and with due regard to the principles of the Concordat to Support Research Integrity.

More broadly, we will be contributing to discussions on the future of the UK research integrity landscape, and our role within it. By working together, we can safeguard UK research integrity, now and in the future.

Reference List

1 Review of Research Bureaucracy, 22 March 2021, accessed July 2024.

2 Independent review of the UK's research, development and innovation organisational landscape, April 2023, accessed July 2024.

3 International comparison of the UK research base, 25 May 2022, accessed July 2024.

4 Research, development and innovation (RDI) organisational landscape: an independent review, 1 October 2021 or March 2023, accessed July 2024.

5 UKRI annual reports and accounts, 13 July 2023, accessed July 2024.

6 International comparison of the UK 0 base, 25 May 2022, accessed July 2024.

7 Research and innovation facts and figures: 2022, accessed July 2024.

8 'Vice-chancellors fear UK sector is hurtling into financial crisis.' Times Higher Education, 18 January 2024, accessed July 2024.

9 The Concordat to support research integrity, October 2019, accessed July 2024.

10 Implementing the Concordat to Support Research Integrity within government, 1 February 2022, accessed July 2024.

11 '"It is Very Difficult for us to Separate Ourselves from this System." Views of European Researchers, Research Managers, Administrators and Governance Advisors on Structural and Institutional Influences on Research Integrity.' Journal of Academic Ethics, 3 February 2023, accessed July 2024.

12 UK Committee on Research Integrity – 2023-2025 work plan, accessed July 2024.

13 Research integrity in the UK: Annual Statement 2023, UK Committee on Research Integrity, 6 July 2023.

14 '"It is Very Difficult for us to Separate Ourselves from this System." Views of European Researchers, Research Managers, Administrators and Governance Advisors on Structural and Institutional Influences on Research Integrity.' Journal of Academic Ethics, 3 February 2023, Accessed July 2024.

15 'What researchers think about the culture they work in.' Wellcome, 15 January 2020, accessed July 2024.

16 'Research integrity: a landscape study.' Vitae, 30 May 2020, accessed July 2024.

17 UK Committee on Research Integrity case studies, accessed July 2024.

18 The Concordat to Support the Career Development of Researchers, September 2019, accessed July 2024.

19 'Integrity in practice toolkit' The Royal Society and UK Research Integrity Office, August 2018, accessed July 2024.

20 The Royal Society, Education and Skills, accessed July 2024.

21 Royal Society of Biology (RSB) Technical Skills Certificate, accessed July 2024.
The RSB Technical Skills Certificate is designed to support the career development of technical staff working in higher education, industry or in a private laboratory.

22 National Institute for Health and Care Research (NIHR) professional development, accessed July 2024.
The NIHR support the professional development of people working in research in order to grow research capacity and capability.

23 Technician Commitment, accessed July 2024.
The Technician Commitment is a university and research institution initiative, led by a steering board of sector bodies, hosted by the UK Institute for Technical Skills and Strategy.

24 UK Reproducibility Network (UKRN) Open Research Programme, accessed July 2024.
The UKRN programme aims to accelerate the uptake of high quality open research practices.

25 The Turing Way Handbook: Guide for Reproducible Research, accessed July 2024.

26 'Questionable Research Practices', UK Research Integrity Office (UKRIO), April 2023, accessed July 2024.

27 UNITED2ACT, accessed July 2024.
UNITED2ACT is a group of international stakeholders working collaboratively to address the collective challenge of paper mills in scholarly publishing.

28 'Communication of Retractions, Removals, and Expressions of Concern (CREC) recommended practice' National Information Standards Organization, 27 June 2024, accessed July 2024.

29 'The MDAR (Materials Design Analysis Reporting) Framework for transparent reporting in the life sciences. 'Proceedings of the National Academies of Science (PNAS), 23 April 2021, accessed July 2024.

30 'STAR Methods (Structured, Transparent, Accessible Reporting)." Cell Press, accessed July 2024.

31 H2020 Programme Guidelines on FAIR Data Management in Horizon 2020, 26 July 2016, accessed July 2024.

32 Ethics toolkit for a successful editorial office, Committee on Publication Ethics, December 2022, accessed July 2024.

33 'International Research Integrity Survey (IRIS), selected UK sample results', Allum and Brooker, 2023, accessed July 2024.

34 The Research Excellence Framework (REF), accessed July 2024.
The system for assessing the quality of research in UK higher education institutions and allocating funding for this research to institutions.

35 FAIR (Findable, Accessible, Interoperable and Reusable) Principles, GO FAIR, 2016, accessed July 2024.
GO FAIR is a stakeholder-driven and self-governed initiative that aims to implement the FAIR data principles.

36 'The FAIR Cookbook – the essential reference for and by FAIR doers.' Scientific Data, 19 May 2023, accessed July 2024.

37 'Open Research Indicators', UK Reproducibility Network (UKRN) open research programme, accessed July 2024.

38 Retraction Watch Database, accessed July 2024. An open-source database of retractions.

39 International Research Integrity Survey, selected UK sample results. Allum and Brooker, 16 February 2019, accessed July 2024.

40 Animal Research: Reporting of In Vivo Experiments (ARRIVE) guidelines, accessed July 2024.
The ARRIVE guidelines are a checklist of recommendations for the full and transparent reporting of research involving animals.

41 Athena Swan Charter, Advance HE, accessed July 2024.
An international framework to support and transform gender equality within higher education (HE) and research.

42 Race Equality Charter, Advance HE, accessed July 2024.
The Race Equality Charter helps institutions in their work to identify and address the barriers facing Black, Asian and minority ethnic staff and students and provides a framework for action and improvement.

43 Equality, Diversity and Inclusion in Science and Health (EDIS) Group, accessed July 2024.
A coalition of organisations working to improve equality, diversity and inclusion within the science and health research sector.

44 Royal Society of Chemistry Inclusion and Diversity Fund, accessed July 2024.
The Inclusion and Diversity Inclusion Fund provides financial support for innovative products, activities and research projects that support inclusion and diversity.

45 Institute of Physics (IOP), Project Juno, accessed July 2024.
Project Juno was prior to closing in June 2023, the IOP's flagship gender equality award for university physics departments and schools of physics, and other related organisations.

46 'Concordat for the Environmental Sustainability of Research and Innovation Practice.' Wellcome, accessed July 2024.

47 'Environmental Policy.' Wellcome, accessed July 2024.

48 'Laboratory Efficiency Assessment Framework (LEAF).' University College London, accessed July 2024.

49 'Framework for Responsible Research and Innovation (RRI).' Engineering and Physical Sciences Research Council (EPSRC), accessed July 2024.

50 'Cape Town Statement on Fostering Research Integrity through Fairness and Equity.' World Conferences on Research Integrity, May 2022.

51 'UK Policy Framework for Health and Social Care Research.' NHS Health Research Authority, September 2023, accessed July 2024.

52 'Use of animals in bioscience research.' Biotechnology and Biosciences Research Council (BBSRC), accessed July 2024.

53 'Sponsors Response – Indicators of Research Integrity: An initial exploration of the landscape, opportunities and challenges.' Guild HE, Cancer Research UK, UK Research and Innovation and the UK Committee on Research Integrity, September 2022, accessed July 2024.

54 'Workshop Report - Indicators of Research Integrity: An initial exploration of the landscape, opportunities and challenges.' Research Consulting, July 2022, accessed July 2024.

55 'Scope Framework for Research Evaluation.' INORMS, accessed July 2024.
The SCOPE framework for research evaluation is a five-stage model for evaluating responsibly.

56 'Wakefield's article linking MMR vaccine and autism was fraudulent.' British Medical Journal, 6 January 2011; 342:c7452, accessed July 2024.

57 'Report into research integrity.' House of Commons Science, Innovation and Technology Committee, 11 July 2018, accessed July 2024.

58 'Reproducibility and Research Integrity.' House of Commons Science, Innovation and Technology Committee, 10 May 2023, accessed July 2024.

59 'Review of Annual Statements on Research Integrity.' Research Consulting, 6 July 2023, accessed July 2024.

60 'Barriers to Dealing with Research Misconduct.' UK Research Integrity Office (UKRIO), 2023, accessed July 2024.

61 'Data sharing: a code of practice', Information Commissioner's Office (ICO), May 2021, accessed July 2024.

62 'International Research Integrity Policy Scan.', KPMG, 31 August 2023, accessed July 2024.

63 'Barriers to Investigating and Reporting Research Misconduct.' UK Research Integrity Office (UKRIO), accessed July 2024.

64 'Dissecting racial bias in an algorithm used to manage the health of populations.' Science, 25 October 2019, accessed July 2024.

65 'Paper Mills and Research Misconduct: Facing the Challenges of Scientific Publishing.' Testimony to the Australian House Committee on Science, Space, and Technology, 20 July 2022, accessed July 2024.

66 'Science in the Age of AI.' Royal Society, May 2024, accessed July 2024.

67 'The United Nations' role in international AI governance.' Royal Society, 19 March 2024, accessed July 2024.

68 'The governance of artificial intelligence: interim report', House of Commons Science, Innovation and Technology Committee, 16 November 2023, accessed July 2024.

69 'Use of generative AI tools in funding applications and assessment.' Research Funders Policy Group, September 2023, accessed July 2024.

70 UKRI Metascience Research Grants, UK Research and Innovation funding finder, 30 April 2024, accessed July 2024.

71 'Protecting scientific integrity in an age of generative AI.' Proceedings of the National Academies of Science (PNAS), May 2024, accessed July 2024.

72 European Code of Conduct for Research Integrity, The European Federation of Academies of Sciences and Humanities (ALLEA), June 2023, accessed July 2024.

73 'Living guidelines on the responsible use of generative AI in research.' ERA Forum, March 2024, accessed July 2024.

74 'Placing research integrity at the heart of REF.' Higher Education Policy Institute (HEPI), May 2024, accessed July 2024.

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