Research integrity:
a toolkit for early career researchers

Created with early career researchers to provide guidance on research integrity shaped by real needs, honest questions and the drive for quality research.

Taylor & Francis Group
an informa business

SENSE about SCIENCE

Contents

2
Introduction

3
Principles

4
Research design

6
Research conduct

12
Developing & submitting manuscripts

16
Peer review

17
Dissemination & engagement

18
Glossary

19
Useful resources

Introduction

Research integrity refers to all the factors that underpin good research practice and promote trust and confidence in the research process. It is foundational for building public trust in science. A lack of integrity undermines scientific credibility, spreading misinformation, and potentially harming those who depend on reliable research findings.

It applies to:

- all disciplines and all sectors where research is carried out.
- the whole research lifecycle, from the initial idea to the dissemination of findings.
- the environments within which research is conducted and the values and behaviour they promote – often described as 'research culture'.

Some systemic pressures undermine research integrity. For example, pressure to publish papers or to compete for funding and job security can encourage bad practices such as omitting data or misstating authorship. As an early career researcher, you may feel some pressures more acutely and it's important you have confident knowledge of the principles of research integrity and good practice throughout the research cycle.

"Employability precarity. I have been through six-month contracts and shorter, some fixed-term contracts without any guarantee that the contract is not the last one. This creates a lot of stress to perform while also looking for other jobs in the background."
Research Fellow, University of Surrey

"I've seen issues related to lack of informed consent, when malaria-control interventions have been implemented which while reducing morbidity and mortality, also lower the immunity of the community, and are then withdrawn causing rebound infections. I wonder whether if the community had been given all the information, they would have accepted being part of the study".
PhD researcher, Liverpool School of Tropical Medicine

We partnered with early career researchers to create practical guidance that addresses real integrity challenges throughout your entire research journey. This isn't theoretical—it's built from genuine questions, actual needs, and the pursuit of research excellence.

This toolkit is intended to help you embed research integrity into your research practice from the outset, but whatever stage you're at, you can jump straight to the information you need.

Research integrity across the research cycle

Principles

The European Code of Conduct for Research Integrity (2023) sets out four principles for research integrity:

- **Reliability in ensuring the quality of research, reflected in the design, methodology, analysis, and use of resources.**
- **Honesty in developing, undertaking, reviewing, reporting, and communicating research in a transparent, fair, full, and unbiased way.**
- **Respect for colleagues, research participants, research subjects, society, ecosystems, cultural heritage, and the environment.**
- **Accountability for the research from idea to publication, for its management and organisation, for training, supervision, and mentoring, and for its wider societal impacts.**

These principles govern guidance on research integrity and help you to think about what to do in new situations.

It is a researcher's responsibility to think about and adhere to ethical guidelines. Doing so embeds transparency and honesty in your work, and fosters a culture of integrity within your teams, institutions and collaborations.

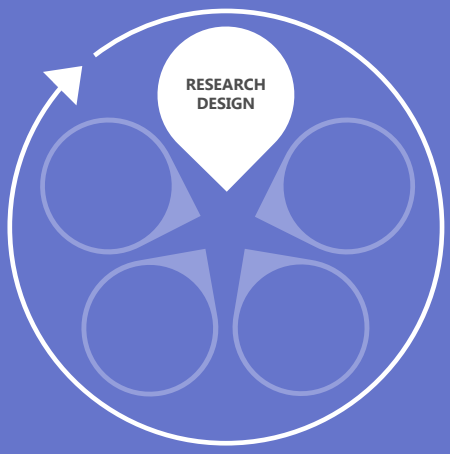
"Having proactive support from those in more senior positions has made me more confident to advocate for research integrity."
Katherine Brown, PhD researcher, University of Cambridge

The Singapore Statement from the World Conferences on Research Integrity includes a list of 14 responsibilities of researchers, which are useful when reflecting on how you can embed research integrity into practice.

"In practice this means reflecting on what research integrity best practice will be at each stage and delivering it. It's not always a clear path, but I've noticed that the most impressive researchers I work with see it as their responsibility, and foundational to delivering research in the public interest."
Robin Brooker, PhD researcher, University of Essex

"In engineering, we often choose between physical and computational experiments. It's not just about practicality – sustainability matters too. For example, using concrete in a lab may yield more accurate results, but a simulation avoids material use. So, we must balance precision with environmental responsibility."
Petia Tzokova, Postdoctoral researcher, University of Cambridge.

Let's look more closely at the research cycle to see how researchers do it in practice.



Research design

Research design refers to the methodology or framework for conducting research, including how data is collected, analysed and interpreted. Poorly designed studies:

- **result in inaccurate conclusions**
- **undermine the reliability of research**
- **waste resources**
- **damage reputations**
- **damage future research by others**

As early career researchers, you may face constraints such as limited experience, inadequate training or pressure to produce results quickly, which can lead to poor design choices.

Reproducibility and replicability

Although "reproducibility" and "replicability" are sometimes used interchangeably, reproducibility means obtaining consistent results using the same original data. Replicability means obtaining consistent results across studies aimed at answering the same scientific question, each of which has obtained its own data.

Factors such as lack of open research good practice and poorly described or flawed methods can prevent researchers from being able to reproduce or replicate a study.

Research must be ethical and replicable, although in some disciplines (humanities and social sciences) strict replication or reproducibility can be challenging. To achieve this:

1. The design should be appropriate for the research question. For example, if the question is 'Does this intervention decrease the risk of family breakdown?' the study design must have the numbers and representativeness required to answer it. A non-randomised study involving interviews with twenty families would be limited to answering a different question, such as, 'What is the experience of some families of this intervention?'

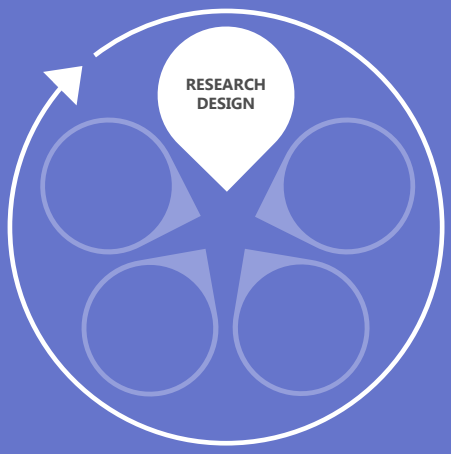
2. The study design must also try to address confounding variables or potential biases that could affect results, such as estimating the effect of excluding sites that are hard to sample or restricting the role of a commercial funder in the analysis. Critical Appraisal Skill Programme (CASP) has some good explainers about the **different types of research bias**.

3. The ethical implications must be identified and managed.

You should ensure adequate planning time for replicability and ethical considerations in the design phase, to ensure that everything that could compromise the conduct of the research, and the validity, reliability and quality of findings, is discussed and addressed. When you have your proposed design, you should map ethical considerations to it so you can consider whether you require more time and resources to manage them well.

The EQUATOR-network[1] offers freely available guidance to support research design, including a central hub for guidelines for different study types.

1 The UK EQUATOR Centre is hosted by the Centre for Statistics in Medicine (CSM), NDORMS, University of Oxford.



Use of AI in Research

The use of Artificial Intelligence (AI) in research is rapidly increasing. It offers exciting possibilities for all stages of a research project as well as aspects of the research process. However, it gives rise to a number of challenges:

- **potential for bias in AI algorithms, caused by unrepresentative or flawed underlying data, which can skew results**
- **concerns over accountability and transparency where researchers don't understand or can't explain how the AI is making decisions**
- **over-reliance on AI-generated conclusions or the uncritical acceptance of results**
- **ethical concerns regarding the use of AI in sensitive research areas, such as privacy violations or the replacement of human decision-making**

There are also wider concerns about the ethics of AI and its impact on society and on the environment.

Given the fast-moving and technologically complex nature of this field, you should seek advice from your institution on how best to approach these issues.

To ensure that AI is used appropriately, researchers need be proactive in mitigating risks to research integrity by:

- **critically evaluating AI tools to understand the data that they've been trained on**
- **ensuring appropriate data handling**
- **being transparent about when and how AI has been used**

If you have used AI responsibly as part of your research you should detail this in the methods or acknowledgements section.

UK Research Integrity Office (UKRIO) have produced guidance on Embracing AI with Integrity. **'Embracing AI with Integrity.'**

The European Commission have **'Living Guidelines on the Responsible Use of Generative AI in Research.'**

Research conduct

If you are employed in a research organisation, your employer should have policies governing good research practice. Become familiar with these before you start research. You should also work through the research policies and guidance provided by any funders of your work. Sometimes, these have more detailed requirements – for example about ethics or data sharing – than your institution. If there are differences, these should be resolved with your institution and funder before you start work.

If your organisation does not have comprehensive policies, you can look for the policy provided by a national research funding body, such as this one from UK Research and Innovation (UKRI) **Policy on the Governance of Good Research Practice.**

In this section we look at some of the areas that may require additional learning and training for early career researchers. Before we do that, check that you know the following:

- **Your organisation's policy on good research practice, and the policy of any funders**
- **The procedure for raising concerns about research integrity**

The first step is to look at your institution's policies on 'Research integrity' or 'Research governance' or 'Research ethics' to see how concerns can be raised. UKRIO provides a **free advisory service** for those wishing to raise a research integrity concern and has published **guidance outlining how whistleblowers should be protected**.

Research ethics and legality

Ethical standards are critical for maintaining public trust in research and ensuring that studies contribute positively to knowledge without causing undue harm.

Ethics and legality are separate but related. A proposed research study might be legal in certain jurisdictions but could still be fundamentally unethical and therefore should not be carried out. As researchers, you have a professional and moral responsibility to conduct ethically sound research, even if the law permits otherwise.

Conversely, research that breaks the law is very likely to be unethical.

A challenge for researchers is the complex, sometimes unclear nature of ethical guidelines, which vary across disciplines, institutions and countries. Unfortunately, there is no alternative to carefully investigating these guidelines to avoid mistakes.

Guidance on research that crosses borders is available from the UKRIO in section 3.4 of its **Code of Practice for Research.**

This code establishes key principles to ensure fairness, respect, care and honesty in global research partnerships: **Global code of conduct for research in resource-poor settings.**

WHO has produced guidance on **sharing and reuse of health-related data for research purposes.**

If you are working with lived-experience experts or community researchers, training is available to support their practice on research integrity, such as this free resource from Imperial College London on **peer research.**

Guidance on ethical considerations when using **coproduction, or public involvement in research** has been published by UKRI.

The Health Research Authority (HRA) has published **guidance to setting payment and incentives** for research participants.

Gatekeepers

Gatekeepers are people and organisations whose permission or help is needed to gain access to research participants or material. Examples are health service providers, education leaders, curators of rare texts and conservation rangers.

- **Gatekeeper approval may be obligatory for ethical approval of your study.**
- **Gatekeeper approval may be essential for the ethical and successful conduct of your study.**

Human research ethics applies to all research involving human participants, regardless of the field of study. Research must be conducted with particular care when it involves health information and vulnerable populations, such as children or people whose ability to advocate for themselves is impaired or limited. In these circumstances, even if you are not involved directly in this part of your project, you are strongly advised to:

- **undertake human research ethics training.**
- **read and understand the restrictions and requirements of the national ethics body.**

Medical researchers doing studies with human participants also need to consider the four ethical principles enshrined in the Declaration of Helsinki[2]:

- **Respect for Autonomy – Requires informed consent and honest communication about risks and benefits.**
- **Non-maleficence – Do no harm; avoid causing unnecessary injury or suffering.**
- **Beneficence – Act in ways that promote the wellbeing of others.**
- **Justice – Treat people fairly and equitably.**

Certain research methodologies raise additional ethical concerns, for example recording the behaviour of people who do not realise they are the subject of research. You should review the way that your research is described in an application for ethical approval to ensure that the proposed methods have been clearly explained.

UKRI have produced **guidance on carrying out research with human participants**.

WHO have produced guidance for their funded research on **ensuring ethical standards and procedures for research with human beings.**

You can also use a **checklist for ethics applications** when doing research with human beings.

You must address imbalances between yourself and participants, ensuring that consent is informed, voluntary and not unduly influenced by your position of authority or inducements.

There is growing evidence that online studies can attract participants who are not genuine, creating substantial risk to the integrity of the research and your own wellbeing.

"During a recent study on childhood vaccination decision-making among parents, I noticed a surge of responses after sharing the recruitment flyer on social media. Some participants did not meet eligibility criteria and provided inconsistent information about ethnicity, child's age, or vaccination status. Some sent direct email requests to participate in the study with similar wording. Others declined to turn cameras on, or gave vague, contradictory responses. I was concerned these weren't genuine participants and risked compromising the credibility of the data, wasting resources, and potentially skewing findings."
Glory Aigbedion, Senior researcher, University of Bedfordshire

Guidance on how to address potentially non-genuine participants can be found here: **Non-genuine Participation in Online Research Guidance on Handling Potential Non-Genuine Participants in Online Research**.

If you are involved in research that involves surveillance technologies or access to data, you should put in place a process to ensure you are truly gaining informed consent. For example, someone who agrees to wear a health monitoring bracelet should have a very clear understanding of what information is being captured and how this is being relayed.

Apply for ethics approval through the HRA here

2 WMA Declaration of Helsinki – Ethical Principles for Medical Research Involving Human Participants – WMA – The World Medical Association

The value of establishing a Research Advisory Board[3]

"The Research Advisory Board (RAB) has played a crucial role throughout my research. Before conducting each study, we review the questions together to ensure they are appropriate and sensitive, and the board represents all key stakeholders included in my research. This includes hospice stakeholders such as patients, bereaved family members, practitioners and others who have cared for loved ones at the end of life.

The RAB is also a mandatory component of my research ethics approval, ensuring strong safeguards are in place, such as allowing participants to pause or stop interviews at any time and reschedule if needed. For me, this initial stage of research design, ensuring ethical rigor and participant wellbeing is a fundamental part of integrity."

Michelle Tierney, PhD researcher, University of Central Lancashire

Animal Research Ethics

While animal research is often subject to legal frameworks and regulatory oversight, there are significant ethical issues that researchers must address, regardless of whether their research falls under legal regulation.

The primary one is ensuring that the research justifies the use of animals and that every effort is made to minimise harm, suffering and distress to the animals involved. Ethical guidelines, such as the **3Rs (Replacement, Reduction, Refinement)**, are designed to provide guidance on reducing the number of animals used, replacing animal models with alternatives where possible and refining techniques to lessen suffering. Even when legally permissible, you are required to reflect on the moral implications of animal research and ensure you approach your work with the highest ethical standards. By doing so, you contribute to a more responsible, transparent and accountable research process.

UKRI have produced information about how to **ensure research with animals conforms to good practice**.

Planning Research and Experimental Procedures on Animals: Recommendations for Excellence (PREPARE) **checklist for planning animal research**.

Animal Research: Reporting In Vivo Experiments (ARRIVE) guidelines for the transparent **reporting of research involving animals** or animal material.

Open research

"For me open research is a way to ensure researchers think twice before any design decisions or actions and provides an opening to challenge questionable practices, data, etc." PhD researcher, Keele University

Open research, also known as open science, means conducting and sharing research in ways that enable transparency, equity, accessibility and reliability. Open research advocates for making research processes, data and findings publicly accessible, promoting transparency, collaboration, and reproducibility, the ability of independent researchers to obtain the same (or similar) results when repeating an experiment or test – one of the hallmarks of good science.

It includes but is not limited to open-access publishing, which makes online scholarly work freely available to anyone. Researchers can often access funds to make their work immediately available from the publisher's website, and authors from low-income countries may qualify for **article processing charge waivers**.

Open research also includes **FAIR data management and sharing**, making your data:

- **Findable**
- **Accessible**
- **Interoperable**
- **Reuseable**

This includes attributing a clear user-license to your data, finding a research data repository (which gives your

3 Research Advisory Board: An advisory group of independent experts that provides strategic advice and guidance on a research project but does not have formal decision-making authority. Research Ethics Committee (REC): A formal and regulated body established by a university, research institute, or healthcare provider to assess the ethical acceptability of individual research projects.

data a persistent identifier, such as a DOI) and adding clear descriptions of your data (metadata) to enable understanding and reuse by other researchers. Even if your data needs to be restricted, the metadata should be open. There are also **best practices to support research software development**.

Another approach which supports transparency is pre-registration, where you submit a time-stamped research plan to a public repository ahead of your study (protocols can be registered at independent registries e.g. the Center for Open Science). This helps prevent undisclosed changes to research methods or analyses, reducing the risk of biased or misleading results. The Open Science Foundation have **guidance on pre-registration**.

You can also submit to a journal that offers Registered Reports as an article type. This is when the study protocol will be peer reviewed and once accepted in principle, the journal commits to publishing the study regardless of the novelty of the results. This takes away the risk of being rejected on account of a negative result (i.e. only positive or significant results being published). The Center for Open Science has further explanation of **Registered Reports**

Open research enhances public trust in research, accelerates the societal impact of research and supports the validation of findings by other researchers. Despite the growing recognition of the benefits of open research, there is still progress to be made in embedding these practices more broadly. Many researchers and institutions are still hesitant to fully embrace open research due to concerns about protecting intellectual property, keeping competitive advantages or securing further research funding, particularly in fields where proprietary data is viewed as crucial for commercial or academic success. As an early career researcher, you may face additional pressures, such as limited institutional support or a lack of clear guidance on how to share data while protecting your work. There may also be institutional or cultural barriers to embracing open practices, as some parts of the research community still favour traditional closed models of research dissemination. Without wider adoption, the full potential of open research remains underutilised, hampering its goals to improve research integrity, accountability and the overall impact of research. You are encouraged to foster greater transparency and collaboration to ensure that research outputs are accessible and accountable to the broader community.

Equality, diversity, and inclusion (EDI) in Research

Research practices should be fair, representative and accessible to people from all backgrounds, regardless of gender, ethnicity, disability or socioeconomic status. Ignoring these considerations can result in research that:

- **is incomplete or misleading.**
- **increases bias in data.**
- **is not useful for decision making or future research.**
- **leads to perceptions and policies that are unjust.**
- **harms the regard for researchers, collaboration and the ability to do future work.**

Biases in research design, participant selection and data interpretation have previously led to findings that are not generalisable. Particular care should be taken with research that relies on data from past studies where this may be the case – for example building a machine learning model from it.

The EQUATOR-network has produced useful guidelines to mitigate biases in the training dataset and analytics in human health research **Artificial intelligence/Machine learning studies | Study Designs | EQUATOR Network.**

You should also reflect on how you can embed equitable research partnerships (e.g. moving away from budgets and leadership being exclusively held by institutions in high-income countries in global collaborations). Guidance on fostering equitable research collaborations can be found in **The Cape Town Statement on Fostering Research Integrity through Fairness and Equity**.

When developing research questions, you should ensure that the people or communities most affected by the research issue have been engaged and listened to as part of this process. You should also consider how to appropriately incorporate indigenous and local knowledge in evidence synthesis (e.g. **as part of climate mitigation and adaption work of the IPCC**).

Research misconduct

Research misconduct refers to behaviour that deliberately or recklessly fails to meet standards of conduct expected in research:

- **fabrication:** making up results, other outputs or aspects of research, including documentation and participant consent
- **falsification:** inappropriately manipulating and/or selecting research processes, materials, equipment, data, imagery and/or consents
- **plagiarism:** using other people's ideas, intellectual property or work (written or otherwise) without acknowledgement or permission
- **failure to meet** legal, ethical and professional obligations
- **misrepresentation** of data or other information
- **failure to declare** or manage conflicts of interest

Honest errors and differences in, for example research methodology or interpretations, do not constitute research misconduct. Misconduct can have long-lasting consequences, including:

- **harms to research participants**
- **loss of trust in research findings**
- **damage to the research record**
- **retracted papers**
- **damaged reputations and disciplinary action**
- **a loss of confidence in the research community as a whole**
- **spread of misinformation based on poor or fraudulent research**

Early career researchers we spoke to were all motivated to increase their knowledge and awareness of misconduct and how to report it. Wariness of reporting misconduct is understandable and can be hard for early career researchers, particularly when it involves senior colleagues or high-profile studies.

However, if you do not report your suspicions and it later becomes known you were aware of potential misconduct, you risk being implicated or seen as complicit in a cover-up. Choosing not to report may also allow continued harm (e.g. to research participants). If speaking to a supervisor or head of department has not helped, consult someone you trust such as your university's research culture lead or research integrity champion. Discuss your concerns with them, in confidence, and decide on the right actions; informal approaches may be enough and a formal investigation might not be needed.

Questionable Research Practices

Questionable Research Practices (QRPs) are behaviours which may not meet the strict definition of research misconduct but still compromise the trustworthiness of research findings.

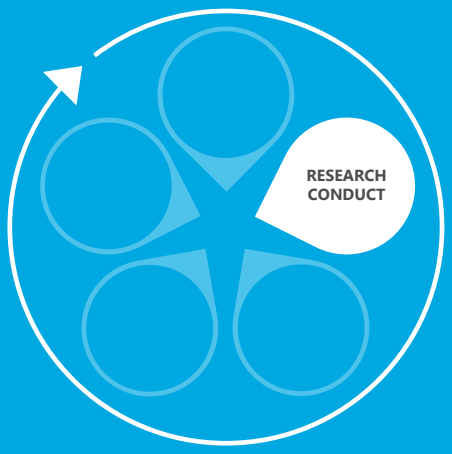
Some QRPs are subtle, such as selective citation or presenting misleading information in grant applications, while others, like keeping inadequate records or failing to properly supervise junior researchers, can lead to more significant problems with data integrity and research reliability.

Other examples include:

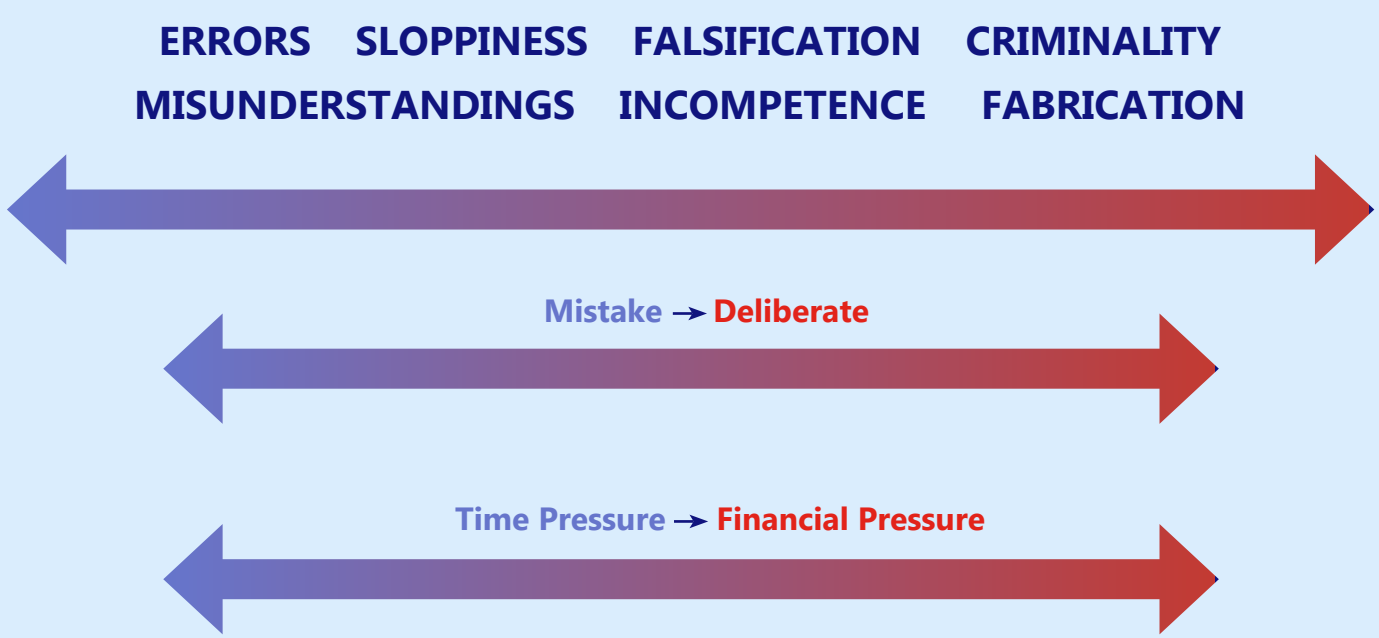
- **failing to publish negative findings that could challenge previously published work.**
- **"Hypothesising After the Results are Known" (so-called HARKing)**
- **manipulating data or analysis to achieve a statistically significant result (p-hacking)**
- **concealing contradictory results**
- **demanding authorship for work without meeting the appropriate criteria or not attributing authorship when warranted.**

These practices, while not always intentional, contribute to the distortion of the research record and undermine the credibility of published findings.

UKRIO's position is that QRPs should be viewed as a spectrum of behaviours, ranging from honest errors and mistakes at one end to more serious behaviours at the other. This framing highlights that QRPs are not just about a small number of people behaving dishonestly. Instead, everyone involved in research may at times engage in QRPs, so it's up to everyone involved in research to recognise and address the problem in their own, as well as others' research.



The spectrum of questionable research practices



By recognising that QRPs exist on a spectrum we can work out the best way to address them. If they're a result of sloppiness, misunderstanding or even incompetence, we can look at how to improve research, for example through:

- **taking time to follow clear methodologies**
- **learning how to use rigorous statistical tests**
- **following reporting guidelines**
- **ensuring data is made open and transparent**
- **improving record keeping**

Developing & submitting manuscripts

Publication ethics

There are a number of ethical issues to be aware of when submitting your research for publication in academic journals. These include:

AI: This is a fast-moving area, so check the latest guidance on the appropriate use of AI before submitting your article. While most publishers will allow you to use AI for tasks like language polishing, including AI-generated images in your article may not be permitted. The key principle is to be transparent about the use of AI tools in your research or article writing. Please also note that AI does not meet the criteria for authorship, so cannot be listed as a co-author of your article.
Taylor & Francis AI Policy

Authorship: Every author listed on a journal article must have made a significant contribution and as an author or co-author you share responsibility and accountability for it. This means you should not add someone's name to the author list if they have not been involved in the research (known as 'gift authorship' or 'guest authorship'). Equally, it is unethical to leave off anyone who has made a significant contribution to the paper (aka 'ghost authorship'). It is not only traditional academic contributors who can be authors, but also, for example technicians and undergraduates, provided they meet the criteria. Initiatives such as **Contributor Roles Taxonomy (CRediT)** enable authors to state the individual contributions of each listed author on the article. The order in which authors' names appear on the article (e.g. alphabetical, by seniority, level of contribution) can vary by region and field of study so, to avoid disputes later on, it is best to agree the format before you even start the research.
Defining authorship for your research paper
Authorship guidelines issued by COPE
UKRIO guidance on authorship integrity

"I had an issue with authorship where both the other contributing authors were more senior than myself. Despite putting in the work that started the literature review and contributing more substantially, another researcher appeared in the paper ahead of me." PhD researcher, University of East Anglia

Citation manipulation: This is when authors excessively self-cite or prearrange with others to inappropriately cite each other's work. Only cite your own work or that of other researchers when it is genuinely relevant.
Different forms of misconduct.

Conflicts of interest: When submitting your article, you and all co-authors must declare any conflicts of interest (aka competing interests). This will enable the editors, reviewers and readers to take your declaration into account when considering your work. You should also detail all sources of funding that supported your research.
Disclosure of a conflict of interest.

Data: It is essential that all data you use are accurate and representative of your research. Depositing your data in a repository and providing a data availability statement with your article will support transparency and reproducibility.
Sharing and citing data.

Images: Misconduct includes the inappropriate duplication, manipulation or fabrication of images used in your article. You must not make any alterations to experimental photographic images which could mislead readers about the scientific interpretation.
Image or data manipulation/fabrication.

Duplicate submission: You cannot submit your article to more than one journal for consideration at the same time. It risks duplicate publication when the same article is published in more than one journal, compromising the scholarly record. Spend time carefully deciding which journal to submit your work to first and only if that journal rejects your article should you submit to another (after revising it based on any useful feedback from the first).
Guidance on overlapping publications

Paper mills: Paper mills are organisations or individuals that aim to profit from the creation, sale, peer review and/or citation of manuscripts at scale which contain low value or fraudulent content and/or authorship, with the aim of publication in scholarly journals. Paper mill articles frequently include plagiarism, manipulated images and fake data. As outlined in the authorship section above, you should only ever put your name to an article when you have made a significant contribution to it and can take responsibility for its content.
Paper mills, profits and perverse incentives

Publishers have had to retract many papers at once when systematic misconduct such as fabricated data, paper mills or coordinated peer review manipulation was discovered across multiple articles.

How to avoid predatory journals

Predatory journals or publishers are those which charge authors a fee for publication without providing legitimate peer review or editorial services. Here's how to identify and avoid them:

Warning signs

- **A journal title which can be easily confused with another journal**
- **Spams researchers with emails inviting for submissions**
- **Poor grammar and spelling in communications**
- **No publisher address or contact information**
- **Advertises/promises of unusually rapid publication**
- **Vague or misleading journal scope covering disparate fields**
- **Lack of information on the policies of the journal, such as peer review, licensing and copyright**
- **Fake impact factors**
- **Unprofessional website with broken links or design issues**
- **Hidden publication fees/charges**
- **False claims about indexing in major databases such as DOAJ or PubMed**

Read more from Think. Check, Submit

Verification steps

- **Check if the journal is listed in reputable databases (DOAJ, Scopus, Web of Science)**
- **Verify publisher membership in recognized associations (COPE, STM, OASPA)**
- **Confirm editorial board members exist and are actually affiliated**
- **Review several published articles for quality**
- **Consult colleagues about journal reputation before submission**
- **Use the Think-Check-Submit checklist**

Plagiarism: Plagiarism is passing off the work of others as your own. This might include the use of other researchers' data, images and ideas, as well as their words. You can ensure you don't inadvertently plagiarize by properly citing any research and sources you've drawn on for your article. You should also mark any verbatim text from other sources with quotation marks.
Plagiarism
Plagiarism FAQs

Self-plagiarism: Also known as 'text recycling', self-plagiarism is the redundant reuse of your own work, without proper citation, which can create repetition in the scholarly record. If it is unavoidable for you to reuse your own previous work, make sure you cite it fully.

Third-party material: You should not use copyrighted material (e.g. text, photographs, film stills, musical notation) in your article without first getting permission from the copyright holder.
Understanding copyright for journal authors

Rejections, corrections and retractions

Most publishers have staff, technology and processes in place to detect potential ethics and integrity issues in new manuscripts submitted to their journals. This includes software to spot plagiarism, image manipulation and the undeclared use of AI. A manuscript will most likely be rejected before publication if an ethical problem is identified.

If concerns are raised about an article after publication, the publisher may launch an investigation in line with their policies and COPE guidelines. You should be given the opportunity to respond to any concerns about an article you have authored.

While the investigation is underway, or if the investigation is inconclusive, the publisher may publish an **expression of concern**. This enables readers to exercise caution, especially in cases with a risk of harm, such as when medical decisions could be made based on the research article under investigation.

If it is found that there are problems with an article, the editor and publisher may choose to make a correction. A **correction** notice will be published alongside the article to give readers the details of the change.

For serious issues, including research or publication misconduct, or errors that invalidate the paper's conclusions, the article may be **retracted**. It will be clearly marked as retracted and a separate retraction statement will be published, outlining the reasons for retraction.

Please remember that not every corrected or retracted article is the result of unethical activity. Sometimes genuine mistakes are made, and authors are often keen to correct the scholarly record. If you discover that there is an error in one of your own published papers, the corresponding author should get in touch with the publisher to request an update.
Corrections, retractions and updates after publication
Retraction Watch tracks retractions to provide openness to the scientific process
UKRIO webinar dispelling myths around corrections

Benefits and challenges of preprints

A preprint is a complete draft of a research article that is made publicly available before peer review and formal publication on an online repository (e.g. arXiv for physics, bioRxiv for biology and SSRN for social science). When using preprints, you should be aware of the potential challenges and balance the benefits of rapid dissemination with responsible research practices, ensuring that your work meets ethical standards even before peer review. Some obvious benefits and limitations of preprints include:

Benefits

- **Rapid dissemination:** Research findings become available immediately without lengthy peer review processes before publication, which helps speed up scientific progress.
- **Priority publication:** A preprint receives a DOI which gives authors a public and citable record that protects their work against competition.
- **Early feedback:** Authors can receive community input before formal journal submission.
- **Increased visibility and access:** Open access nature allows wider readership and potential collaborations.
- **Career development:** Preprints offer early career researchers a track record of their productivity. Many funding bodies accept preprints in grant applications.

Challenges

- **Quality assurance:** Lack of formal peer review verification may lead to dissemination of flawed methods or conclusions.
- **Misinformation risk:** Unvetted papers may be misinterpreted by media or public, potentially spreading inaccurate information. Non-academic audiences may not know the difference between a preprint and peer-reviewed article and could therefore be more easily misled.
- **Research integrity:** Without editorial oversight, ethical standards may not be consistently applied.
- **Version control:** Multiple versions can create confusion about which is the final version.
- **Corrections/retractions:** When an article is corrected/retracted, it may not be communicated in the preprint, so readers are unaware of the errors or retraction status.

To address quality concerns of preprints, a new preprint server **VeriXiv** by F1000 publishes verified preprints, where a preprint will go through a rigorous series of ethics and integrity checks (similar to those conducted on many journals) and a set of optional open research checks before being published.
Preprints and Scholarly Communication: An Exploratory Qualitative Study of Adoption, Practices, Drivers and Barriers

Peer review

Peer review is an essential process: experts assess the quality, validity (whether it was conducted in line with norms and standards) and originality of research before it is published. It plays a crucial role in maintaining research standards and preventing the dissemination of flawed or fraudulent research. However, several challenges can hinder the effectiveness of peer review. Sense about Science collaborated with editors and researchers to produce a **Nuts and bolts guide to peer review**, which opens up the black box of peer review, sharing editor insights, the different types of peer review and some of the challenges which, can hinder its effectiveness.

One key issue is the prevalence of bias, such as favouritism towards certain research topics, an ideological slant, authors or institutions, which can lead to unfair evaluations.

"[I've seen] weaponizing of the peer review process where there's overlap in a peer reviewer's work, so they give extra negative feedback or suggest further experiments to delay the process so they can get their research out first." PhD researcher, University of Edinburgh.

There are other challenges, for example in open peer review, early career researchers in particular can be hesitant to criticise research papers/practices of more established researchers in their field because of perceived potential backlash. While in double anonymised peer review (where reviewer and author are both anonymous) there is increased onus on editors to address potential biases.

Another issue is inconsistency in the quality of reviews, as the process can be subjective and not all reviewers are equally skilled in identifying flaws or providing constructive feedback. Researchers may take on their first peer review under a mentor, but the level of support offered is variable.

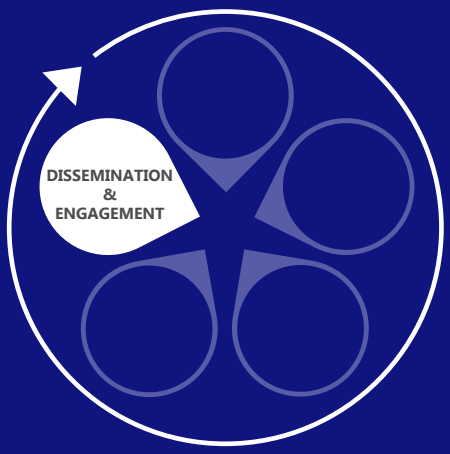
"Learning to review journal papers is a key skill, but there isn't much formal support on how to do it. I found it particularly difficult to judge what level of detail was needed, or what elements to focus on, as peer reviews are not typically accessible or published ...nor did I have any first-hand experience of being on the receiving end. I can imagine the experience of reviewing, and quality of the review itself, varies dramatically between PhD students and depends heavily on the support from their supervisor." PhD researcher, Imperial College London

These issues can result in flawed research being published, which undermines trust in the scientific process. It is key that you are aware of these challenges and work to ensure transparency, fairness and objectivity in the peer review process, both as authors and reviewers. Reviewing is a role that is integral to the research process, so it's important that early career researchers get involved in the process early on:

- **Contact a journal editor or ask a senior colleague to recommend you –** journal editors are always looking out for new reviewers, especially those with expertise in areas under-represented in their pool of contacts. If there's a journal that you read regularly, email the editor directly or ask a colleague to pass on your details.
- **Look out for calls for reviewers –** some journals circulate calls for reviewers, for example if the journal is new or expanding its scope into a different area.
- **Register with a journal's publisher –** some publishers invite aspiring reviewers to add their details to a reviewer database.
- **Find a mentor –** ask a senior colleague, with experience in reviewing, whether you could work with them on a review.
- **Raise your visibility on researcher networking sites –** academic networking sites, such as ResearchGate or Academia.edu, are places to build a profile where editors looking for new reviewers can find you.
- **Sign up for a certified training course which supports researchers in their understanding of peer review.** Details of courses can be found on page 25 in **Peer Review: the nuts and bolts - Sense about Science**

AI in Peer Review: Reviewers must not upload text or images from an unpublished manuscript into a generative AI tool, as this may infringe upon intellectual property rights. Generative AI may only be used to improve the language of a peer review report.

Dissemination & engagement



Engaging directly with the public (e.g. through social media, public talks or community events) provides the opportunity to both share your work and listen to questions and concerns that people have. It can also inform future research.

To deliver on your ethical commitment to any research participants involved in your study, the findings and implications should be shared with them in an accessible way. Communicate clearly: consider the most suitable format and whether translations are needed. The Health Research Authority provides guidance on **Informing Participants**.

Public engagement also allows researchers to reflect on effective communication -- how do you frame your research to support understanding? When you consider the values and wider societal context within which your research sits, this leads to more trustworthy communication. Consider whether the way you communicate your research equips people to ask useful questions themselves.

Journalists seek compelling stories, which will require you to frame research in an interesting angle without compromising scientific accuracy. Building relationships with journalists can facilitate accurate reporting of research findings. Understanding their challenges and working together can also lead to more effective science communication.

Being open about what we know, what we don't and how confident we are also invites trust. Levelling with people about the trade-offs, the limitations and uncertainties of research as well as the strengths shows that you have the humility to update with more evidence. In a wider context of misinformation and overconfidence, transparency about uncertainty is what sets responsible research apart. (For more support to communicate scientific uncertainty and understanding where it matters most, see **Making sense of uncertainty**, produced by an interdisciplinary group of researchers and practitioners).

Many researchers work in high stakes areas (e.g. immigration, vaccine safety, drug efficacy, climate mitigation, public health, behavioural science related to public policy, emerging technologies, engineering biology, AI or research involving animals) where it is vital to take responsibility for how evidence is used in society. To do this effectively, an understanding of policymakers' needs and the problems they are aiming to solve is very important. With that understanding, you can provide them with clear, accurate information, timed for when they need it.

Tips for communicating research to policymakers:

1. **Know how your research relates to societal challenges.**
2. **Understand policymaking and how decisions are made in your country.**
3. **Think about the questions that policymakers need answers to.**
4. **Get to know your audience.**
5. **Build your visibility and credibility and maintain your contacts.**
6. **Keep your language and message simple.**

For more information on how to reach policymakers see these resources:
Getting your research into UK Parliament
10 steps to reach and inform policymakers

Glossary

Data handling is the process of collecting, storing, processing, protecting, documenting, transferring, sharing, retaining and disposing of research data in accordance with legal, ethical and institutional requirements.

The Declaration of Helsinki is a statement of ethical principles for medical research involving human participants, first adopted by the World Medical Association (WMA) in 1964, periodically revised and serves as a global standard.

Gatekeepers are the people and organisations whose permission or help is needed to gain access to research participants or material.

Intellectual property is a creation of the mind that can be legally owned and protected. It can include the subject matter, methods, tools and outputs you create as part of your research.

Open research or open science relates to how research is performed and how knowledge is shared based on the principle that research should be as open as possible.

Peer review is the independent assessment of a research paper by other researchers in the field. The purpose of peer review is to evaluate the paper's quality and suitability for publication, and it's also used to review grant proposals for research funding.

Questionable research practices are research behaviours that, while not constituting intentional research misconduct, depart from recognised standards of good research practice and can compromise the trustworthiness of research findings.

Replicability is obtaining consistent results across studies aimed at answering the same scientific question using new data collected under the same experimental conditions and protocols

Reproducibility is obtaining the same or similar results when rerunning analyses from previous studies using the original design, data and code.

Research bias refers to systematic errors in the design, conduct, analysis or reporting of research that can distort the validity and reliability of research findings.

Research culture encompasses the behaviours, values, expectations, attitudes and norms of research communities and institutions. It influences researchers' career paths and influences the way that research is conducted and communicated.

Research data repository is a digital service or online platform where researchers deposit, store, preserve, and share their research data, code and metadata. These repositories support open science and research integrity by enabling access, transparency and reuse of research outputs.

Research design is a systematic plan outlining how a study is conducted, including methods of data collection, procedures and tools for analysis.

Research dissemination is the planned process of communicating research findings and the wider context to other researchers, policymaker, practitioners or public groups through appropriate channels and formats, with the aim of increasing awareness, understanding and potential impact.

Research ethics refers to the moral principles and practices guiding research, from its inception through to completion and publication of results and beyond.

Research governance refers to the framework of regulations, policies, principles and standards that guide the ethical, legal and responsible conduct and oversight of research.

Research integrity is all the factors that underpin good research practice and promote trust and confidence in the research process and its outcomes.

Research misconduct covers behaviours that deliberately or recklessly fails to meet standards of conduct expected in research, from initial idea to reporting outcomes.

Research practice encompasses the day-to-day activities, behaviours and methods used by researchers.

Useful resources

Publication ethics
- Committee on Publication Ethics (COPE)
- How to avoid authorship conflicts

Sustainability in research
- LEAF - A New Approach to Achieving Laboratory Sustainability
- Design your research for sustainability

Ethical use of animals in research
- National Centre for the Replacement Refinement and Reduction of Animals in Research
- European Animal Research Association
- Ethical considerations regarding animal experimentation

Equality, Diversity and Inclusion (EDI) in research
- Diversity and Inclusion Survey (DAISY) Question Guidance (Version 2)
- Ethical considerations regarding animal experimentation

Avoiding low quality journals
- Think. Check. Submit.
- Predatory Publishing: Evaluating Predatory Journals

Research standards, guidelines and open research
United2Act against paper mills
- Good reporting guidelines to enhance quality of study design and transparent reporting in health research EQUATOR-Network
- Infographics and fact sheets on data and metadata standards including the FAIR data principles
- Octopus a new publishing platform for scholarly research
- Open Research Across Disciplines
- Australian Code for the Responsible Conduct of Research

Responsible use of AI
- Taylor & Francis AI Policy
- Recommendations for a Classification of AI Use in Academic Manuscript Preparation - STM Association

Good practice dissemination, public, media and policy engagement
Taylor & Francis: Sharing versions of journal articles versions of journal articles
- Taylor & Francis Research Impact Hub: the role of research in policy and public engagement
- Voice of Young Science alumni network (led by Sense about Science), support for engaging with the public, media and policy engagement

Research integrity training resources
- UK Research Integrity Office
- UKRIO Expert webinar series
- Online Learning Tool for Research Integrity and Image Processing

Contact

Taylor & Francis Group
an **informa** business

www.taylorandfrancis.com

Taylor & Francis supports diverse communities of experts, researchers and knowledge makers around the world to accelerate and maximize the impact of their work. We are a leader in our field, publish across all disciplines and have one of the largest Humanities and Social Sciences portfolios. Our expertise, built on an academic publishing heritage of over 200 years, advances trusted knowledge that fosters human progress.

SENSE
about SCIENCE

www.senseaboutscience.org

Sense about Science is an independent body that promotes the public interest in sound science and evidence. Founded in 2002, Sense about Science works with decision-makers, world-leading researchers and community groups to raise the standard of evidence in public life and to ensure the public has access to the evidence behind important decisions.

Acknowledgements
This guidance is produced with thanks to the early career researchers who participated in co-creation workshops or provided feedback. Their engagement and openness both underlined the need for the toolkit and directly informed its content. We are grateful to the UK Research Integrity Office (UKRIO) for expert advice and the source material that was modified from **What is research integrity**? Material was compiled by Emily Jesper-Mir and Nita Pillai of Sense about Science.

Published under creative commons licence