How can we foster research integrity

Lex Bouter

2022-07-07 How can we foster RI – Queen Mary University – London - UK – 45 minutes in total (20 presentation and 25 interaction).
Content

- How research integrity and open science hang together
- National Survey on Research Integrity
- Drivers of research integrity
- What can research institutes do?
During the last decade there has been a shift from detecting and sanctioning FFP via prevention of QRPs towards stimulating RRPs. During that same decade open science gained momentum and it also became clear that the replication crisis is driven by QRPs (selective reporting first and foremost).

This slide shows how research integrity, the replication crisis and open science hang together. Red arrows indicate an undesirable impact, like lowering research quality, truth and trust or increasing the replication crisis. Green arrows depict effects we want to see: more transparency, more accountability, more truth, more more trust, higher research quality, less replication crisis, less FFP and less QRPs.

Open science modalities have the potential to strengthen the validity and trustworthiness of research.


Haven T, Tijdink T, Martinson B, Bouter L, Oort F. Explaining variance in perceived

www.nsri2020.nl


11 QRPs were assessed on a 7-pointscale raging from 1 (never) to 7 (always) referring to the last 3 years.


https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0263023

### Most prevalent (5/11) QRPs (score 5,6,7)

<table>
<thead>
<tr>
<th>QRPs</th>
<th>Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not submitting or resubmitting a valid negative publication</td>
<td>17.5</td>
</tr>
<tr>
<td>Insufficient mentioning of study flaws and limitations in publications</td>
<td>17.0</td>
</tr>
<tr>
<td>Insufficiently supervised or mentored junior co-workers</td>
<td>15.0</td>
</tr>
<tr>
<td>Insufficient attention to equipment, skills or expertise</td>
<td>14.7</td>
</tr>
<tr>
<td>Inadequate notes of research proces</td>
<td>14.5</td>
</tr>
<tr>
<td>QRP/FF</td>
<td>Prevalence (%)</td>
</tr>
<tr>
<td>-------------------------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Any Frequent QRP (at least 1/11 QRPs with a score of 5,6,7)</td>
<td>51.3</td>
</tr>
<tr>
<td>Fabrication (making up data or results)</td>
<td>4.3</td>
</tr>
<tr>
<td>Falsification (manipulating research materials, data or results)</td>
<td>4.2</td>
</tr>
<tr>
<td>Any FF (either fabrication or falsification or both)</td>
<td>8.3</td>
</tr>
</tbody>
</table>

11 QRPs were assessed on a 7-pointscale ranging from 1 (never) to 7 (always) referring to the last 3 years. Fabrication and Falsification was assessed by a dichotomous question (yes/no) referring to the last 3 years.


https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0263023
What is good for the *truth* of and the *trust* in research is not always good for your academic career.

Many rewards in academia are linked to having positive and spectacular results as these are published more easily in high impact journals and will be cited more often.

The various Questionable Research Practices (QRPs) have in common that they can effectively help to get these positive and spectacular results.
This slide shows – in a simplified way – how things can go wrong.

In most disciplines the proportion of papers reporting positive results increases over time. Positive results are published and cited more often, and also get more media attention. This will probably increase the likelihood of getting grants and tenure. We have also some evidence that conflicts of interest and sponsor interests may lead to sloppy science or worse. QRP and RM can effectively help to get (false) positive results.

Negative findings are so unpopular that often these are not reported at all. This mechanism will lead to publication bias, selective reporting and selective citation. Especially small studies with positive outcomes will predominantly be chance findings. These phenomena will distort the published record and can explain the large replication difficulties some fields (e.g. preclinical research) experience.

Personal interests and sponsor interests can lead to QRP and RM also if researchers are not aware of it. Many of us want to please our sponsor with a view to motivate them to keep funding our work. That could lead for instance to subtle flaws in the study design, to selective reporting and to spin in the report of the results of the
There is evidence for some of the relations suggested in this slide, but no or only little evidence for most of them. We really need more solid empirical research to clarify how these things work. Gaining this knowledge is important for effectively fostering RCR and preventing QRP and RM.
Functioning of moral compass depends on:

**Individual factors:**
- virtuousness of the individual

**Institutional factors:**
- research climate in the lab

**Systemic factors:**
- adequate incentives

Researchers navigate the dilemmas in their work with their moral compass. The quality of thes compass depends on how virtuous the researcher at issue is.

But there are also strong other drivers of their behaviour in the direct professional environment and the system of science at large.

That doesn’t diminish the personal responsibility to behave well in research. In fact it makes personal responsibility larger: individual researchers also have to help to improve the research climate and to remove perverse incentives.
<table>
<thead>
<tr>
<th>Explanatory Factors</th>
<th>QRP</th>
<th>RM</th>
<th>RRP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Likelihood of detection (reviewers)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Publication pressure</td>
<td>↑</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Following academic norms</td>
<td>↓</td>
<td></td>
<td></td>
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<tr>
<td>Organizational justice</td>
<td>↓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mentoring (survival)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mentoring (responsible)</td>
<td>↓</td>
<td></td>
<td></td>
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<tr>
<td>Competitiveness</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Work pressure</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Funding pressure</td>
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</table>

Arrows refer indicate the association of the explanatory at issue with the outcome listed. Green arrows indicated associations with better research integrity, red arrows indicate association with worse research integrity. These effects were derived from a multivariable regression model containing five background variables and all explanatory factors.

Please remember that the data come from a cross-sectional study and by no means 'prove' causality.

https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0263023

https://doi.org/10.12688/f1000research.110664.1
Mertonian norms

Communism (scientific knowledge is not private property. Scientists must share it with the scientific community, otherwise knowledge cannot grow.)

Universalism (whether scientific knowledge is judged as true or false is judged by universal, objective criteria)

Disinterestedness (being committed to discovering knowledge for its own sake)

Organised scepticism (no knowledge claim is regarded as ‘sacred’. Every idea open to questioning, criticism and objective investigation.)

https://en.wikipedia.org/wiki/Mertonian_norms

Aspiring to greater intellectual humility in science

Rink Hoekstra*1,4 and Simine Vazire*2,3,4

<table>
<thead>
<tr>
<th>0. Title and abstract</th>
<th>0.1. The abstract should describe the limitations of the study and boundary conditions of the conclusion(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.2. Titles should not state or imply stronger claims than are justified (for example, causal claims without strong evidence)</td>
</tr>
<tr>
<td>1. Introduction</td>
<td>1.1. The novelty of research should not be exaggerated</td>
</tr>
<tr>
<td></td>
<td>1.2. Selective citation should not be used to create a false sense of consistency or conflict in the literature</td>
</tr>
<tr>
<td>2. Methods</td>
<td>2.1. The methods section should provide all the details that a reader would need to evaluate the soundness of the methods and to conduct a direct replication</td>
</tr>
<tr>
<td></td>
<td>2.2. The timing of decisions about data collection, transformations, exclusions and analyses should be documented and shared</td>
</tr>
<tr>
<td>3. Results</td>
<td>3.1. Detailed information about the data and results (including informative plots and information about uncertainty) should be provided</td>
</tr>
<tr>
<td></td>
<td>3.2. It should be transparent which analyses were planned and where those plans were documented; weaker conclusions should be drawn to the extent that analyses were susceptible to data-dependent decision-making</td>
</tr>
</tbody>
</table>

https://doi.org/10.1038/s41562-021-01203-8
# Aspiring to greater intellectual humility in science

**Rink Hoekstra**\(^{1,2,3,4}\) and **Simine Vazire**\(^{1,2,3,4}\)

## 4. Discussion

4.1. The statistical uncertainty of results should be incorporated into the narrative conclusions drawn from the results.

4.2. The research summary should capture the full range of results (for example, include our 'most damning result').

4.3. **Causal claims should be only as strong as the internal validity of the study allows.**

4.4. Claims about generalizability should be only as strong as the sampling of participants, stimuli and settings allows.

4.5. All conclusions should be calibrated to the confidence in the construct validity of the measures and manipulations.

4.6. Alternative interpretations should be presented in their strongest possible form (‘steelmanned’).

4.7. A discussion of the limitations should be incorporated throughout the discussion section, rather than bracketed off in a subsection.

## 5. Post publication guidance for authors

5.1. Insist that press releases and reporters capture the limitations of the work, and correct outlets that exaggerate or misrepresent.

5.2. **Encourage criticism, correction and replication of the work**, and respond non-defensively when errors or contradictory evidence are brought to light.

5.3. When appropriate, retract papers, issue corrections or publish ‘loss of confidence’ statements.

[https://doi.org/10.1038/s41562-021-01203-8](https://doi.org/10.1038/s41562-021-01203-8)
https://wellcome.org/reports/what-researchers-think-about-research-culture

https://russellgroup.ac.uk/media/5925/realising-our-potential-report_4-compressed.pdf?=section2

https://russellgroup.ac.uk/media/5924/rce-toolkit-final-compressed.pdf?=section2

https://russellgroup.ac.uk/media/5923/realising-our-potential-case-studies_3-compressed.pdf?=dl1
The Academic Research Climate Amsterdam study among UvA, VU and Amsterdam UMC explored Dutch research culture: www.amsterdamresearchclimate.nl

Preregistration of study protocol and data analysis plan: https://osf.io/x6t2q/

Publications:

The Wellcome Trust published in 2020 a very informative survey results on how researchers perceive their culture: https://wellcome.ac.uk/sites/default/files/what-researchers-think-about-the-culture-they-work-in.pdf.

The UK Russell Group of research universities offer great materials to change research culture in the desired direction:

https://russellgroup.ac.uk/media/5925/realising-our-potential-report_4-compressed.pdf?=section2

https://russellgroup.ac.uk/media/5924/rce-toolkit-final-compressed.pdf?=section2

https://russellgroup.ac.uk/media/5923/realising-our-potential-case-studies_3-compressed.pdf?=dl1

https://www.vumc.nl/educatie/onze-opleidingen/opleidingsdetail/superb-supervision-senior-a-course-for-senior-phd-supervisors.htm

Early career researchers can drive reform and make the difference. Here are some examples of networks that accelerate local change.

https://www.ukrn.org/

https://reproducibilitea.org/

https://inosc-starter-kit.netlify.app/
Assessment of researchers

- Grant applications
- Vacancies
- Promotion
- Tenure
- Awards
Incentives works well

For *intended* effects:
- More publications and citations

But also for *unintended* effects:
- Focus on quantity, not quality
- More plagiarism and duplicate publication
- More ‘salami slicing’, gift authorship and use of predatory OA journals
- Citation cartels and fake papers and fake peer reviewers
- Stronger ‘Matthew effect’, less equity
- Less time-consuming responsible research practices

All incentives can and will be gamed if stakes are high

Both the upsite and the downsite of incentives is that they work so well. That means that if not carefully chosen they can do a lot of damage.
How to realize fair assessment procedures of researchers is outlined in the Hong Kong Principles.

The name Hong Kong refers to the city where the 6th WCRI was held in 2019. Before and during the conference we discussed the HKPs and after the conference they were endorsed by its participants.

https://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.3000737

Please endorse the HKPs at www.wcrif.org/guidance/hong-kong-principles
On this webpage you can also find best practices, PP slides and a video on the HKPs.

More initiatives to improve the assessment of researchers are reviewed in:
Researchers need help from their institutions in avoiding questionable research practices.

In 2020 we published in Nature what these institutions should do specifically, based on research from a large EU consortium: https://sops4ri.eu/


We declare that the proposal complies with ethical principles (including the highest standards of research integrity as set out in the ALLEA European Code of Conduct for Research Integrity, as well as applicable international and national law, including the Charter of Fundamental Rights of the European Union and the European Convention on Human Rights and its Supplementary Protocols. Appropriate procedures, policies and structures are in place to foster responsible research practices, to prevent questionable research practices and research misconduct, and to handle allegations of breaches of the principles and standards in the Code of Conduct.

The hyperlink of Appropriate procedures, policies and structures opens the Guideline for Promoting Research Integrity in Research Performing Organisations (https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/guidance/guideline-for-promoting-research-integrity-in-research-performing-organisations_horizon_en.pdf) by the SOPs4RI (https://sops4ri.eu/).
The SOPs4RI toolbox for research institutions covers 9 topics. I will provide some examples of the first three of these.


<table>
<thead>
<tr>
<th>Area</th>
<th>Topic</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Support</td>
<td>Research environment</td>
<td>Ensure fair assessment procedures and prevent hypercompetition and excessive publication pressure.</td>
</tr>
<tr>
<td></td>
<td>Supervision and mentoring</td>
<td>Create clear guidelines for PhD supervision (such as on meeting frequency); set up skills training and mentoring.</td>
</tr>
<tr>
<td></td>
<td>Integrity training</td>
<td>Establish training and confidential counselling for all researchers.</td>
</tr>
<tr>
<td>Organization</td>
<td>Ethics structures</td>
<td>Establish review procedures that accommodate different types of research and disciplines.</td>
</tr>
<tr>
<td></td>
<td>Integrity breaches</td>
<td>Formalize procedures that protect both whistle-blowers and those accused of misconduct.</td>
</tr>
<tr>
<td></td>
<td>Data practices and management</td>
<td>Provide training, incentives and infrastructure to curate and share data according to FAIR principles.</td>
</tr>
<tr>
<td>Communication</td>
<td>Research collaboration</td>
<td>Establish sound rules for transparent working with industry and international partners.</td>
</tr>
<tr>
<td></td>
<td>Declaration of interests</td>
<td>State conflicts (financial and personal) in research, review and other professional activities.</td>
</tr>
<tr>
<td></td>
<td>Publication and communication</td>
<td>Respect guidelines for authorship and ensure openness and clarity in public engagement.</td>
</tr>
</tbody>
</table>
Guidelines for research institutions on the research integrity education of bachelor, master and PhD students

Guidelines for research institutions on the research integrity education of post-doctorate and senior researchers

Guidelines for research institutions on the research integrity education of institutional research integrity stakeholders

Guidelines for research institutions on continuous research integrity education

www.sops4ri.eu


https://osf.io/preprints/metaarxiv/gh4cn/

Preliminary version of the guidelines (pilots ongoing):

https://osf.io/z7m3v/
https://osf.io/6d9ta/
https://osf.io/ya3qj/
https://osf.io/ambg3/
Malcolm Macleod  
Academic Lead for Research Integrity and Improvement

Maurice Zeegers  
UM Platform for Research Ethics and Integrity

https://www.radboudumc.nl/en/education/events/2022-research-integrity-round

https://www.ed.ac.uk/research-office/research-talent-and-culture/research-improvement#:~:text=In%20January%202020%20the%20University,Centre%20for%20Clinical%20Brain%20Sciences.&text=The%20University%20is%20part%20of%20a%20peer%2Dled%20consortium.

https://www.maastrichtuniversity.nl/research/integrity-ethics/um-platform-research-ethics-and-integrity

https://www.nature.com/articles/d41586-021-03493-4?si=09
How research institutes can foster Research Integrity better

- Learn from neighbours on the campus and (inter)nationally
- Get inspiration from available guidelines and materials
- Make a Research Integrity Promotion Plan
- Have an active and diverse Research Integrity Committee
- Ensure coherence and continuity of efforts
Website: www.wcrif.org
Twitter: @WCRIFoundation
Vimeo: https://vimeo.com/user175668074