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Questionable Research Practices and Open Science: A Scientometric Perspective of 50 years of Research

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NEOH, Michelle. Questionable Research Practices and Open Science: A Scientometric Perspective of 50 years of Research. (2024). Singapore Open Research Conference 2024. .

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Questionable Research Practices and Open Science: A Scientometric Perspective

12 Nov 2024

Singapore Open Research Conference 2024

Dr Michelle Neoh

What pushes scientists to lie? The disturbing but familiar story of Haruko Obokata

The spectacular fall of the Japanese scientist who claimed to have triggered stem cell abilities in regular body cells is not uncommon in the scientific community. The culprit: carelessness and hubris in the drive to make a historic discovery

EDUCATION

Stanford president resigns after fallout from falsified data in his research

UPDATED JULY 20, 2023 · 6:36 PM ET ⓘ

Harvard professor who studies honesty accused of falsifying data in studies

Francesca Gino, a prominent Harvard Business School professor, alleged to have falsified results in behavioral science studies

Questionable Research Practices

- ▶ 'design, analytic or reporting practices that have been questioned because of the potential for the practice to be employed with the purpose of presenting biased evidence in favour of an assertion' (Banks et al., 2016, p. 3)
- ▶ Selective reporting of results, p-hacking, rounding off decimals of p-values

Psychological Science
Volume 23, Issue 5, May 2012, Pages 524-532
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<https://doi-org.remotexs.ntu.edu.sg/10.1177/0956797611430953>



Research Article

Measuring the Prevalence of Questionable Research Practices With Incentives for Truth Telling

Leslie K. John¹, George Loewenstein², and Drazen Prelec³

factors associated with the prevalence of these issues. The estimates, committing RM concern at least 1 of FFP (falsification, fabrication, plagiarism) and (unspecified) QRPs concern 1 or more QRPs, were 2.9% (95% CI 2.1-3.8%) and 12.5% (95% CI 10.5-14.7%), respectively. In addition, 15.5% (95% CI 12.4-19.2%) of researchers witnessed others who had committed at least 1 RM, while 39.7% (95% CI 35.6-44.0%) were aware of others who had used at least 1 QRP. The results document that response proportion, limited recall period, career level, disciplinary background and locations all affect significantly the prevalence of these issues. This meta-analysis addresses a gap in existing meta-

publication/citation counts. The self-reported rate of academic cheating was 16.7% and of research misconduct was 3.7%. Thirty-one percent of fellows reported direct knowledge of graduate peers cheating, and 11.9% had knowledge of research misconduct by colleagues. Only 30.7% said they would report suspected misconduct. A majority of fellows (55.3%) felt that mandatory ethics trainings left them unprepared for dealing with ethical issues. Fellows

Scientometrics: Data-driven approach

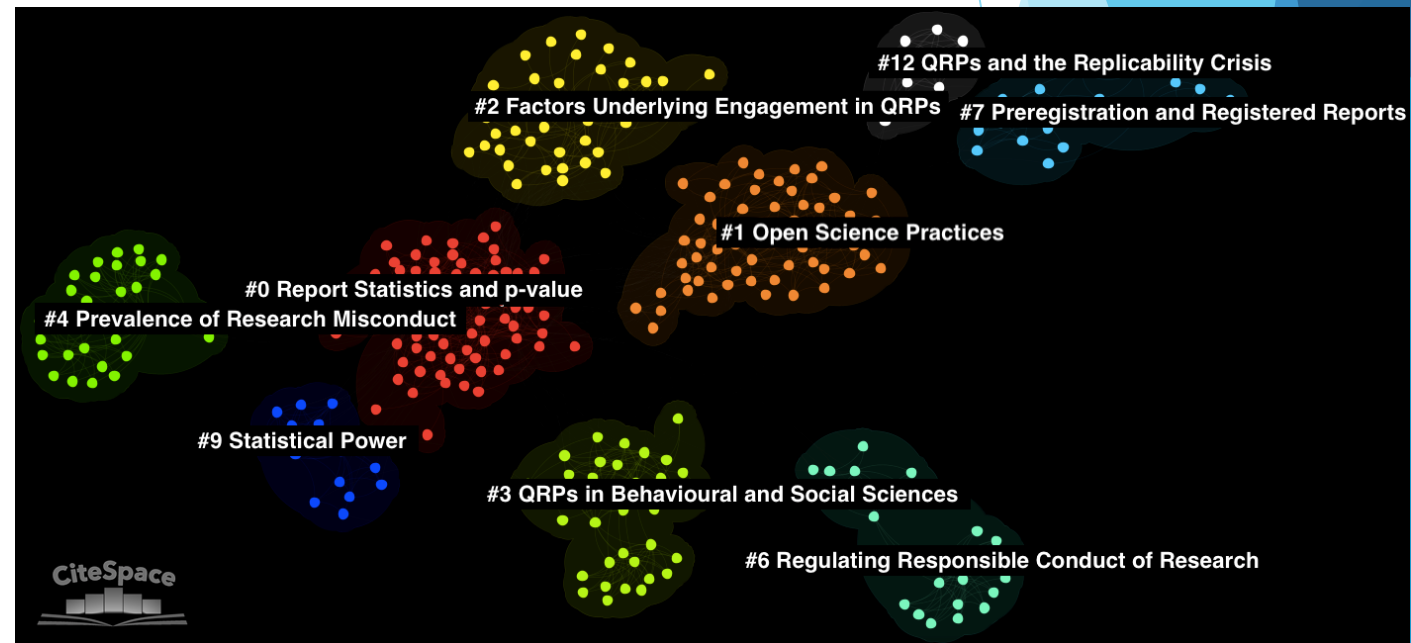
Document co-citation analysis

- ▶ Identify key publications and research trends in QRP in science across time
 - ▶ Thematic clusters: Frequent co-citations among documents are assumed to be reflect clusters of research with a common research theme (Chen et al., 2010)
 - ▶ Network: Made up of (i) documents frequently cited together and (ii) the documents that cite them
- ▶ Temporal shifts in research trends

50 years of QRP research from 1974-2023

Narrative review

- ▶ Identify common themes and links between citing articles and cited articles
- ▶ Highlight main cluster theme, key research topics, significant findings



Open Science – Data sharing

- ▶ Find our dataset and script at <https://doi.org/10.5061/dryad.2fqz612tx>



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Dataset for: Fifty years of research on questionable research practices in science: Quantitative analysis of co-citation patterns

Neoh, Michelle Jin Yee ¹ ; Carollo, Alessandro ² ; Lee, Albert ¹ ; Esposito, Gianluca ²

Author affiliations ▾

Published Sep 26, 2023 on Dryad. <https://doi.org/10.5061/dryad.2fqz612tx>

Cite this dataset

Neoh, Michelle Jin Yee; Carollo, Alessandro; Lee, Albert; Esposito, Gianluca (2023). Dataset for: Fifty years of research on questionable research practices in science: Quantitative analysis of co-citation patterns [Dataset]. Dryad. <https://doi.org/10.5061/dryad.2fqz612tx>

Abstract

Questionable research practices (QRPs) have been the focus of the scientific community amid greater

Data files

> Sep 26, 2023 version files 8.63 MB

Download full dataset

Related works

Software

<https://doi.org/10.5281/zenodo.7950841>

Share

QRPs and the replicability crisis

QRPs as a contributing factor to the replicability crisis

- ▶ Moderate to high prevalence of QRPs involving statistical significance, underpowering, selective reporting (Stürmer et al., 2017)

Replication studies

- ▶ Open Science Collaboration (2015)

One of the first, large-scale replication studies showing low replication rates

39% successful replications out of 100 studies

Open Science Practices

Open Science movement as a response to the replicability crisis and prevalence of QRPs

Patall (2021), Latan et al. (2021), Nosek et al. (2015)

- ▶ Open science strategies: pre-registration, data/material sharing, reporting standards
- ▶ Transparency checklist (Aczel et al., 2019): preregistration, methods, results and discussion, data, code and material availability

Transparency in the research process to address QRPs

Preregistration and registered reports

Recommendations for preregistration and registered reports

Noret et al., 2022, Cook et al., 2021

- ▶ Preregistration: planning and documentation of research hypotheses and questions, intended procedures and materials, and data analysis plans
- ▶ Registered reports: research plans are submitted for peer review, primary basis for acceptance for publication
- ▶ Prevent QRPs such as p-hacking, HARKing, selective reporting of positive results

Move away from publication bias for statistically significant results

Cook et al. (2021), Gotz et al. (2021)

- ▶ Combat inflated effect sizes

Factors underlying in engagement in QRPs

Researcher characteristics

Maggio et al. (2019), Sacco et al. (2018, 2019), Bruton et al. (2020), Yeo-Teh et al. (2022)

- ▶ Attitudes and opinions towards QRPs
- ▶ Personal motivations
- ▶ Perceptions of publication pressure
- ▶ Age, publication numbers, geographical location

Initiatives and interventions targeting QRPs

- ▶ Training for graduate students (Sacco et al., 2019)
- ▶ Emphasis on institutional and structural incentives (Bruton et al., 2020)

Open Science and QRPs: How should we do science?

- ▶ No fixed definition of QRP and varying perceptions of QRP across disciplines
- ▶ No one method for all sciences or types of research
- ▶ Move towards quality research with open science

Minimise bias, maximise transparency?



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Thank you! 😊

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Find our article at <https://royalsocietypublishing.org/doi/10.1098/rsos.230677>

Neoh, M. J. Y., Carollo, A., Lee, A., & Esposito, G. (2023). Fifty years of research on questionable research practises in science: quantitative analysis of co-citation patterns. *Royal Society Open Science*, 10(10), 230677.