

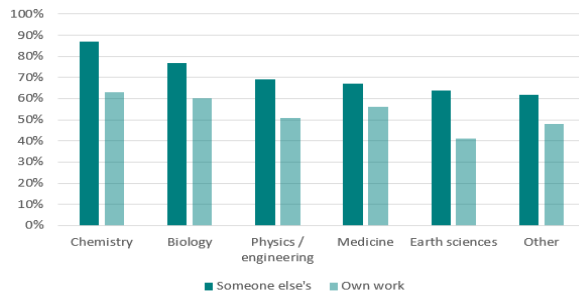
A taste for the unique: the overexposure of non-reproducible studies

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The number of scientific studies published every year has increased steadily over the last few decades. However, according to a survey of over 1,500 researchers published by *Nature* in 2016, there are conflicting sentiments about how reliable much of this ever-expanding body of knowledge really is.¹

A **methodological crisis** is emerging in scientific research: more and more published studies are **impossible to replicate** AND...

Have you ever failed to reproduce an experiment?¹



Marcus Munafo –
Biological
psychologist,
University of Bristol

“We want to be discovering new things but not generating too many false leads.”¹

Aside from **calling into question research and publishing standards**, reproducibility issues have far-reaching implications – for instance, on **allocation of resources and investments** in the pharmaceutical sector, on **policy-making** and on the **public’s trust in research**. Evidence indicates that the papers which will be replicated can be predicted with the use of **prediction markets**² - so why are unreproducible papers published in the first place?

Non-replicable publications are cited more than replicable ones³

Objective

❖ To correlate replicability with citations and investigate whether non-reproducible papers are more likely to be cited.

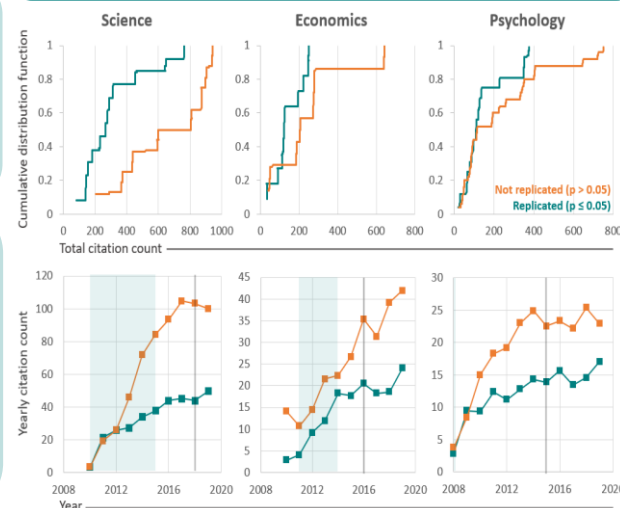
Methods

- **Replicability measures** and **prediction market results** from three major replication studies (covering science, economics and psychology, respectively) were analysed.
- These were correlated with **Google Scholar citations** from the date of publication to the end of 2019.
- **Citation quality metrics** were also collected and evaluated.

Results

- ✓ On average, **papers that replicate are cited 153 times less** than papers that do not replicate, regardless of their characteristics. The largest gap was observed with papers **published in scientific journals**.
- ✓ Papers that failed to replicate are also cited **16 times more per year**, on average, than replicable papers.
- ✓ These effects **persist even after a replication study** has been published. Only 12% of post-replication citations acknowledged a published failure to replicate.

Distribution of total citation counts by replicability (top) and yearly citation count by replicability (bottom)³



Our thoughts:

- In the current “publish or perish” climate, researchers may be **under pressure to produce “interesting” but poorly reproducible results**.
- Conversely, review teams may **apply lower standards** when assessing such studies for publication, even though the data may appear less robust or reproducible according to expert predictions.
- “Interesting” studies are more likely to receive **media attention**, which presents a unique challenge when the research behind them is flawed. The **spread of misinformation** via mainstream or social media has the power to **hamper public health initiatives** and its effects can linger long after a retraction is published.
- A **review of research and publishing standards** has been long been proposed as a solution to the reproducibility crisis. With the heightened public focus on science in the wake of the COVID-19 pandemic, this is now more urgent than ever.

References

1. Baker, M. 1,500 scientists lift the lid on reproducibility. *Nature* 533, 452–454 (2016). <https://doi.org/10.1038/533452a>
2. Dreber A, Pfeiffer T, Almenberg J, Isaksson S, Wilson B, Chen Y, Nosek B, Johannesson M. Using prediction markets to estimate the reproducibility of scientific research. *Proc. Natl. Acad. Sci. U.S.A.* 112, 15343–15347 (2015).
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