

Preregistration of research studies

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Time and place: Mar. 7, 2024 10:00 AM – 11:00 AM, Zoom

Open and reproducible research: An overview

Learn about what open research is and how to make your own research more transparent and reproducible.



Time and place: Mar. 8, 2024 10:00 AM – 12:00 PM, Zoom

How to preregister research studies?

Learn about what preregistration is and how to preregister your own studies.



Time and place: Mar. 11, 2024 10:00 AM – 11:00 AM, Zoom

How to make research reproducible?

Learn about tools and practices for more reproducible and effective research.



Time and place: Mar. 14, 2024 10:00 AM – 11:30 AM, Zoom

How to publish openly?

Learn about preprints, peer-review process, Open Access and how can you choose the best way to publish your results openly.



Time and place: Mar. 15, 2024 10:00 AM – 11:30 AM, Zoom

How to make research more visible?

Learn about different tools, platforms and services to share your research and other contributions, and how you utilise them to make yourself and your work more visible to the academic community and the society at large.


Open and reproducible research courses

March 7th – 15th

Roadmap

- Why should we consider preregistration?
- What is preregistration?
- The benefits and challenges of preregistrations
- How to preregister research? A primer
- Let's try it on OSF!
- Q&A time!

Credibility of academic
research is under debate

 OPEN ACCESS

ESSAY

Why Most Published Research Findings Are False

John P. A. Ioannidis

Published: August 30, 2005 • <https://doi.org/10.1371/journal.pmed.0020124>

nature

Published: 07 October 2015

How scientists fool themselves – and how they can stop

Regina Nuzzo

Nature **526**, 182–185 (2015) | [Cite this article](#)

1246 Accesses | **152** Citations | **2900** Altmetric | [Metrics](#)

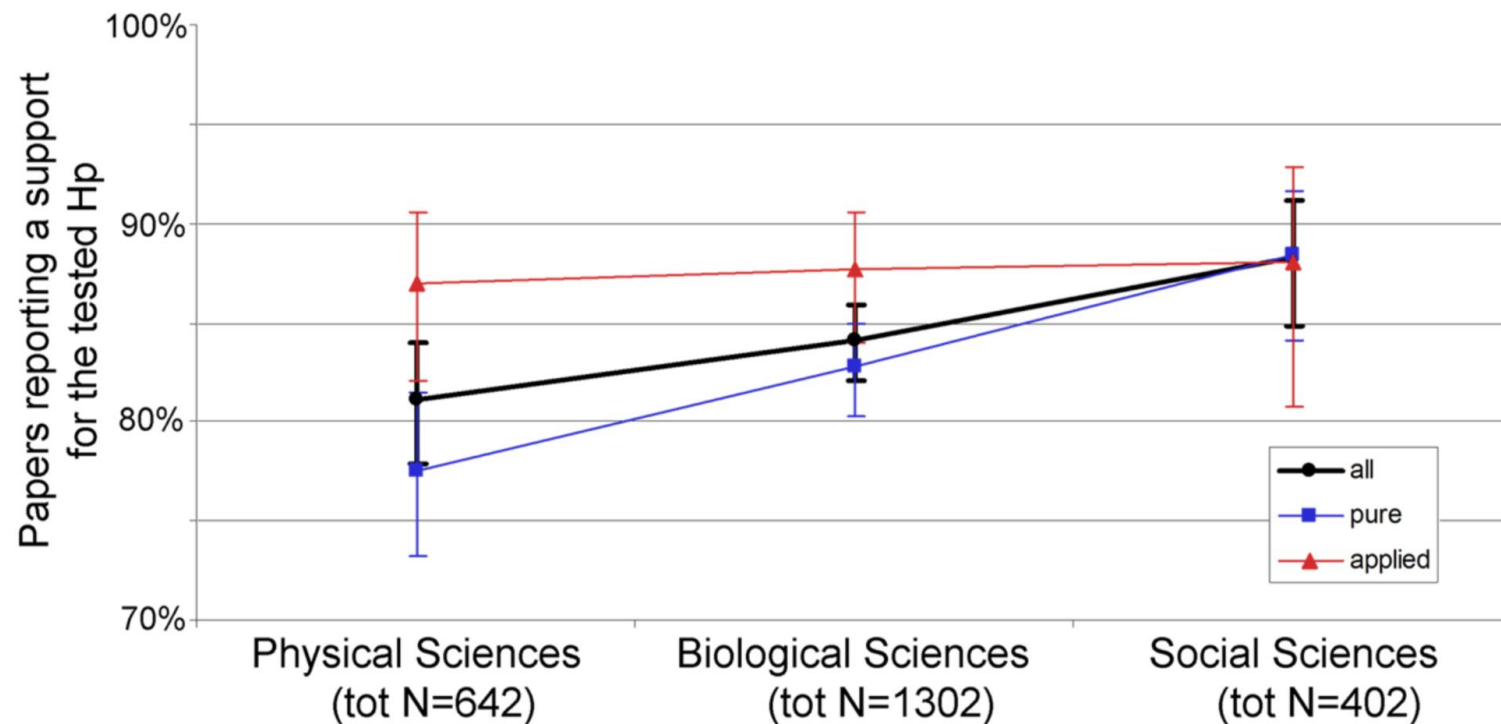
Negative or “boring” results are less likely to be published

(and more likely to end up in a file-drawer)



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Psychological Bulletin
1979, Vol. 86, No. 3, 638–641

The “File Drawer Problem” and Tolerance for Null Results

Robert Rosenthal
Harvard University

For any given research area, one cannot tell how many studies have been conducted but never reported. The extreme view of the “file drawer problem” is that journals are filled with the 5% of the studies that show Type I errors, while the file drawers are filled with the 95% of the studies that show non-significant results. Quantitative procedures for computing the tolerance for filed and future null results are reported and illustrated, and the implications are discussed.

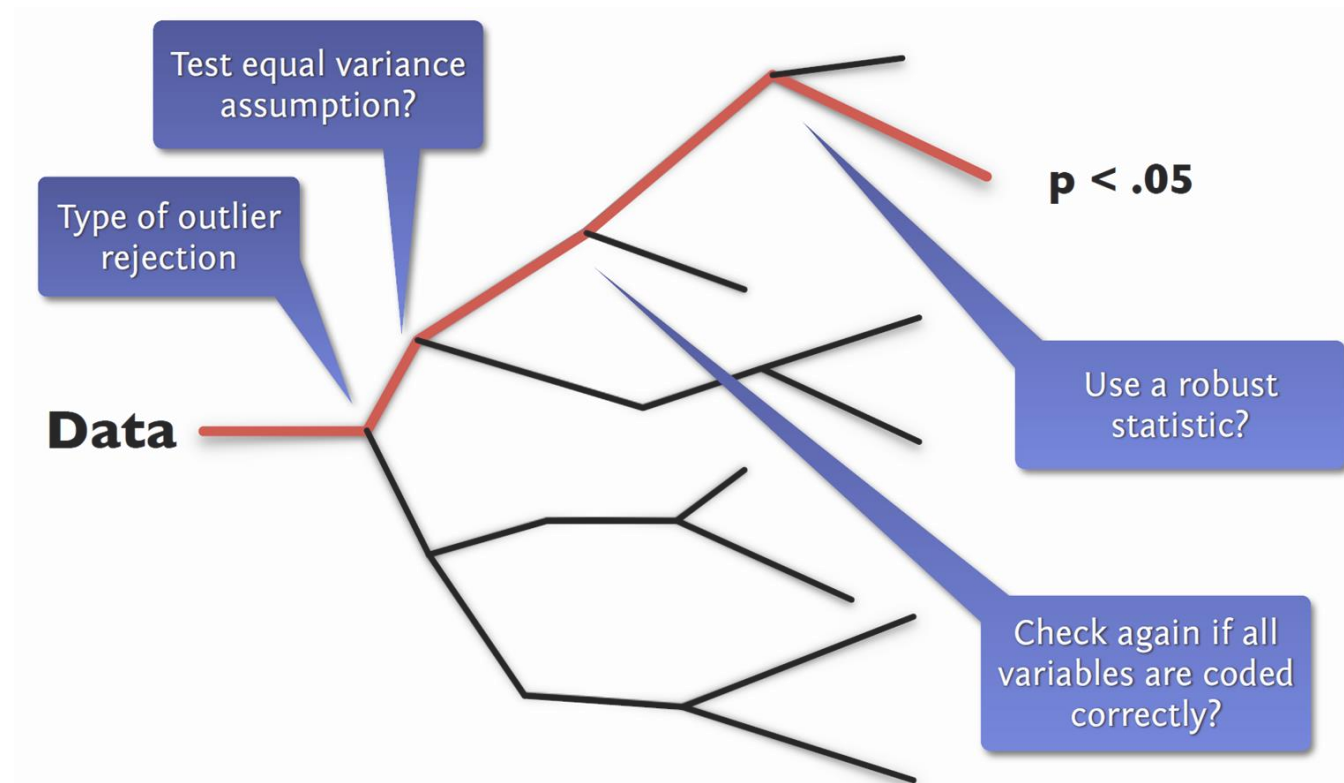
Researchers are biased and make arbitrary decisions

(also called “Researcher degrees of freedom”)



Researchers are biased and make arbitrary decisions

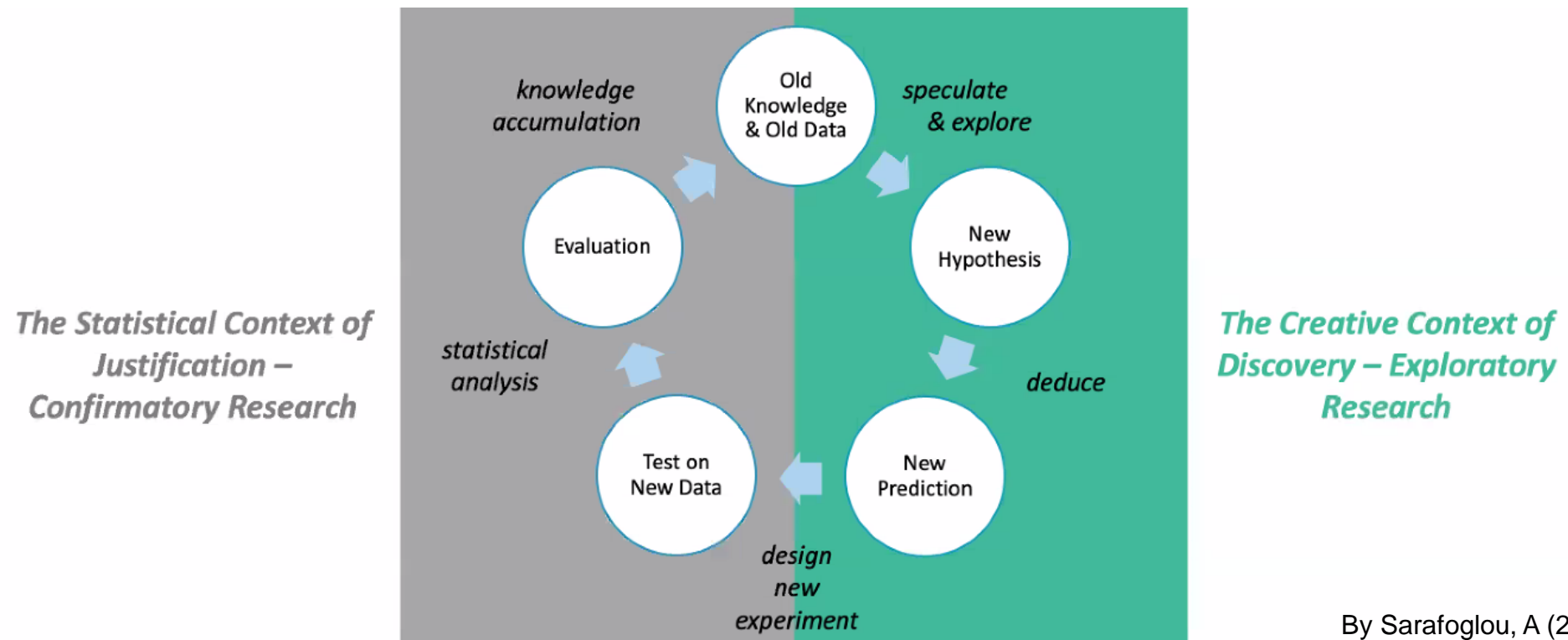
(also called “Researcher degrees of freedom”)



p-hacking
HARK-ing

Confirmatory and exploratory research is being mixed up

(and prediction is confused with post-diction)



File-drawer problem and publication bias



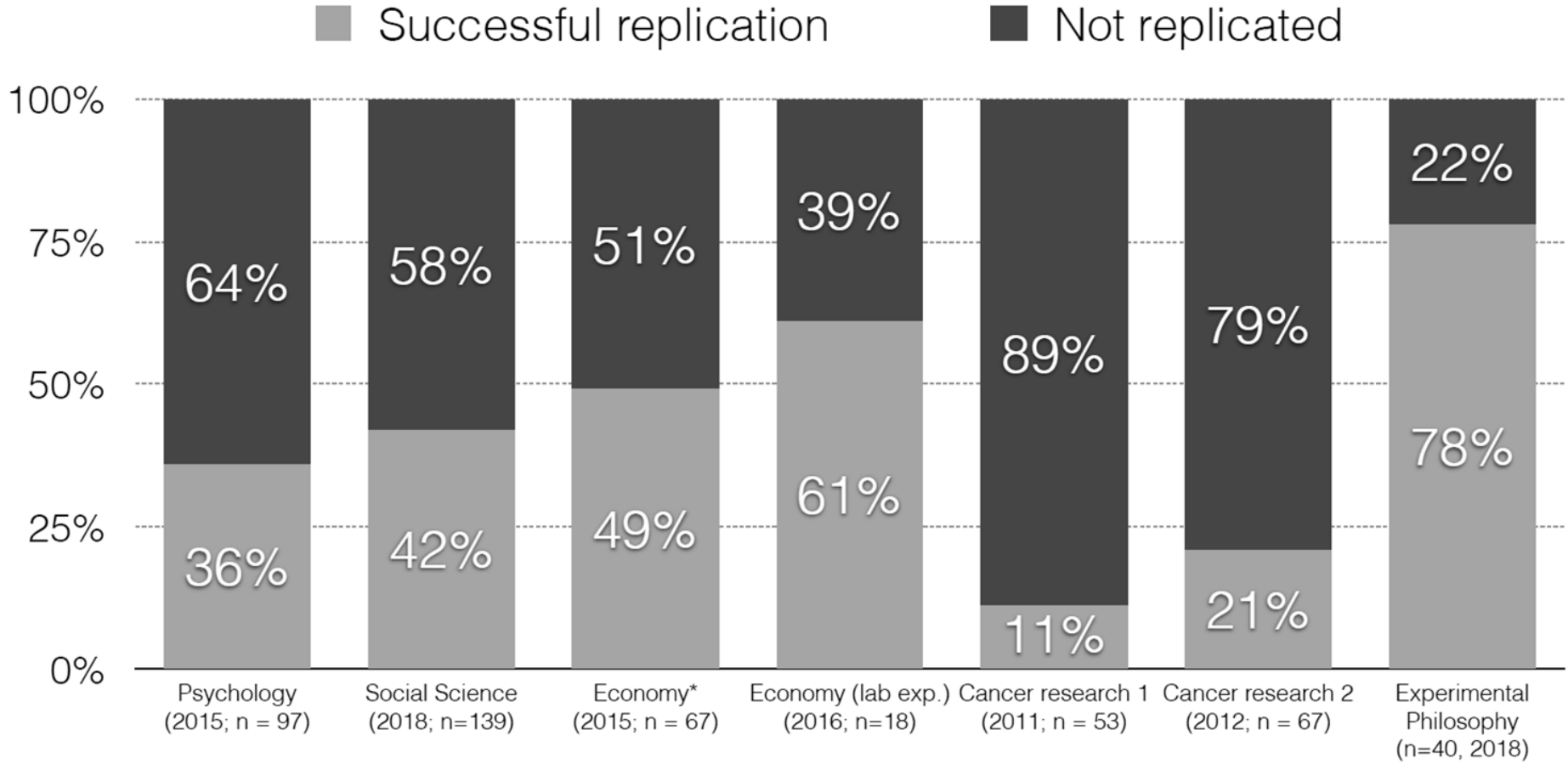
Researcher degrees of freedom



Confirmatory vs exploratory research



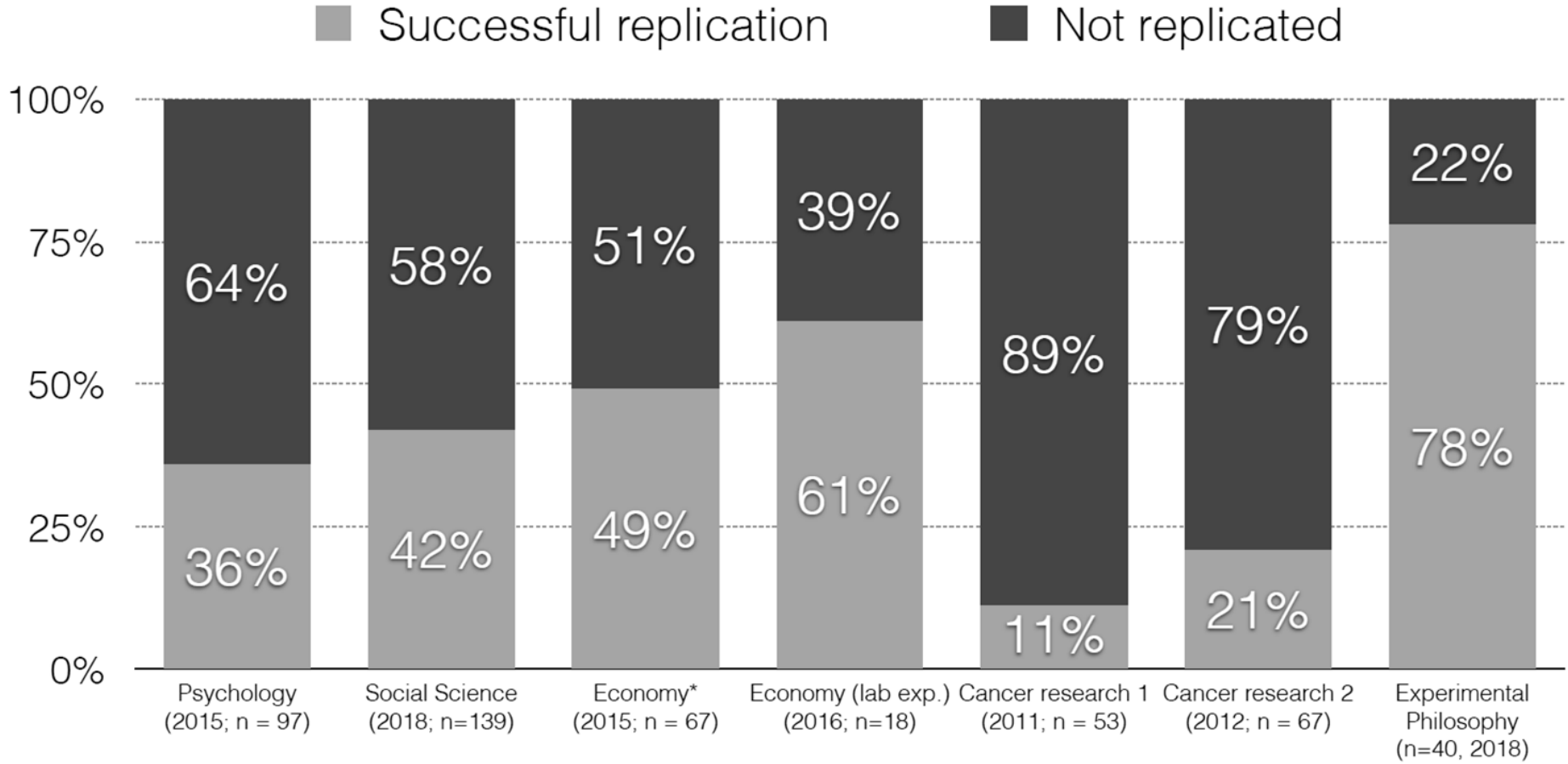
Replication crisis?



Open Science Collaboration (2015); Social Science: Combined sample of systematically sampled projects (RPP, SSRP, EERP); Chang & Li (2015); Camerer et al (2016); Begley, C. G., & Ellis, L. M. (2012). Prinz, F., Schlange, T., & Asadullah, K. (2011); Cova et al. (2018)

Replication is obtaining similar results with new data

Reproducibility is obtaining identical results with the same data



Open Science Collaboration (2015); Social Science: Combined sample of systematically sampled projects (RPP, SSRP, EERP); Chang & Li (2015); Camerer et al (2016); Begley, C. G., & Ellis, L. M. (2012). Prinz, F., Schlange, T., & Asadullah, K. (2011); Cova et al. (2018)

*The data on economics is about reproducibility (getting the same results with the same data)

Preregistration



[Home](#) > [Submit Studies](#) > Why Should I Register and Submit Results?

SUBMIT STUDIES

[Submit Studies to
ClinicalTrials.gov PRS](#)

**Why Should I Register and
Submit Results?**

[FDAAA 801 and the Final
Rule](#)

[How to Apply for a PRS
Account](#)

[How to Register Your Study](#)

[How to Edit Your Study
Record](#)

[How to Submit Your Results](#)

Do you or someone you know want to participate in a clinical study? See [information for patients and families](#).

Why Should I Register and Submit Results?

Contents

- [What Is the Purpose of Trial Registration and Results Submission?](#)
- [Why Do I Need to Register My Trial and Submit Results to ClinicalTrials.gov?](#)

What Is the Purpose of Trial Registration and Results Submission?

Registering clinical trials when they begin, providing timely updates, submitting summary results, and making this information publicly available fulfills a number of purposes and benefits a variety of people.



Journal of Clinical Epidemiology 145 (2022) 164–173

**Journal of
Clinical
Epidemiology**

ORIGINAL ARTICLE

Clinical trial registration was associated with lower risk of bias compared with non-registered trials among trials included in systematic reviews

Kristina Lindsley^{a,b,*}, Nicole Fusco^c, Tianjing Li^d, Rob Scholten^{a,b}, Lotty Hooft^{a,b}

^aJulius Center for Health Sciences and Primary Care, University Medical Center Utrecht, Utrecht University, Utrecht, The Netherlands

^bCochrane Netherlands, University Medical Center Utrecht, Utrecht University, Utrecht, The Netherlands

^cXcenda, LLC, Boston, MA

^dDepartment of Ophthalmology, School of Medicine, University of Colorado Anschutz Medical Campus, Aurora, CO

Accepted 18 January 2022; Available online 23 January 2022

Preregistration



What is preregistration?

The specification of a research design, hypotheses, and/or analysis plan prior to observing the outcomes of a study.

Typically takes a form of a time-stamped, frozen document made available on an online platform.

What do I need to preregister?



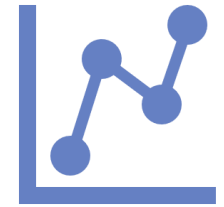
Research questions
and hypotheses



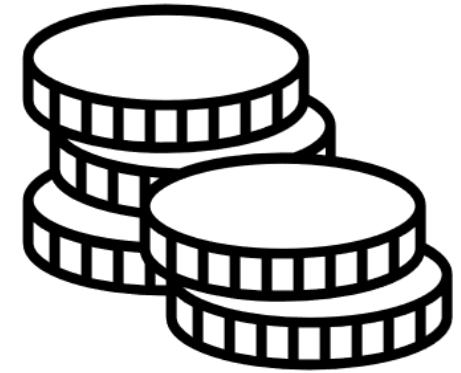
Study design and data
collection methods



Data preprocessing
and analysis plan



A (very) simple example



Hypothesis: The coin is fair. (When throwing a coin multiple times, we will observe equal number of heads and tails).

Methods: We will throw a coin 100 times and register the outcome (head or tail) each time after it falls on the floor. Data collection will stop after $N = 100$.

Data preprocessing: Head outcomes will be labeled as “1” and tails outcomes will be labeled as “0” in the spreadsheet.

Data analysis: We will perform a t-test on the data against chance level (0.5).

Real-life example: quantitative

Voice onset time in Norwegian infant-directed speech over development

Preregistered on Open Science Framework: <https://osf.io/5nwxu>

Real-life example: qualitative

Exploring Loneliness and Social Isolation in Emerging Adulthood

Preregistered on Open Science Framework: <https://osf.io/6cq8h>

Preregistration vs Registered Report

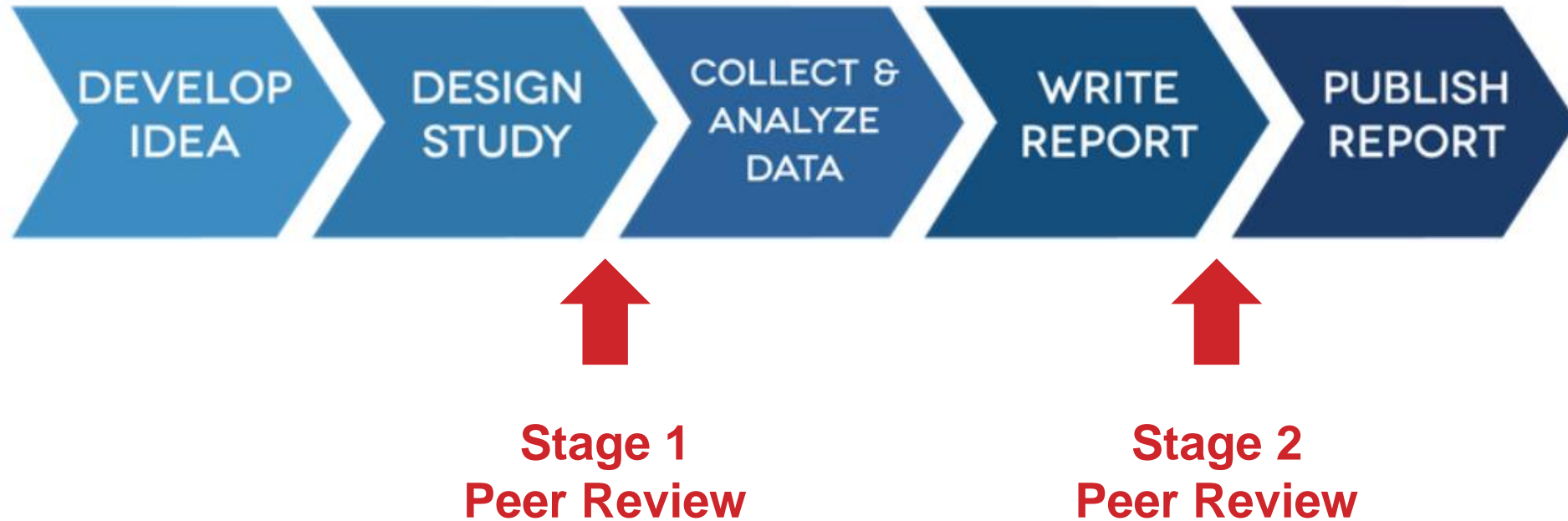


Preregistration vs Registered Report



**Preregister and time-stamp
on an online platform
(no peer review)**

Preregistration vs Registered Report

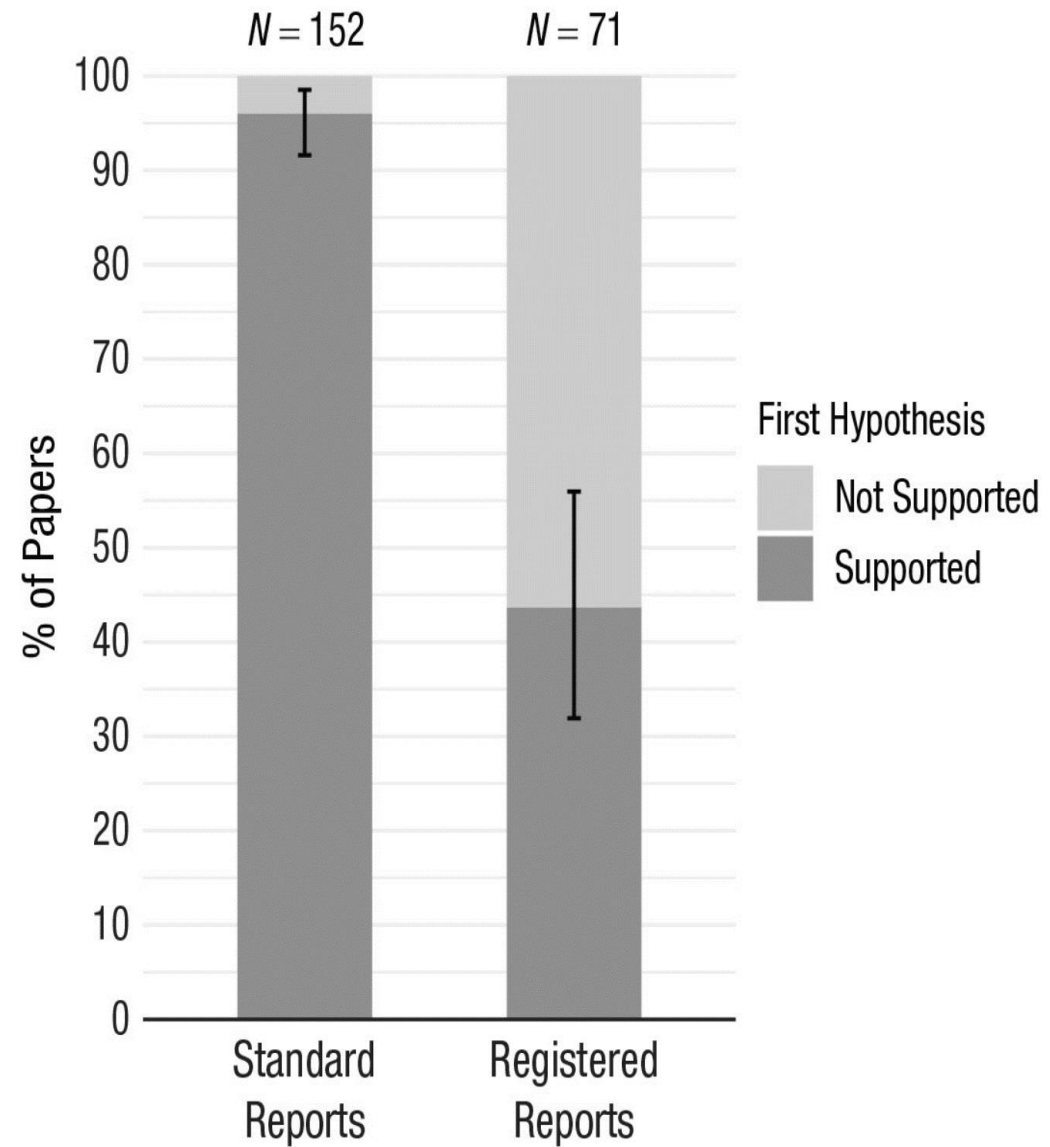


Preregistration vs Registered Report

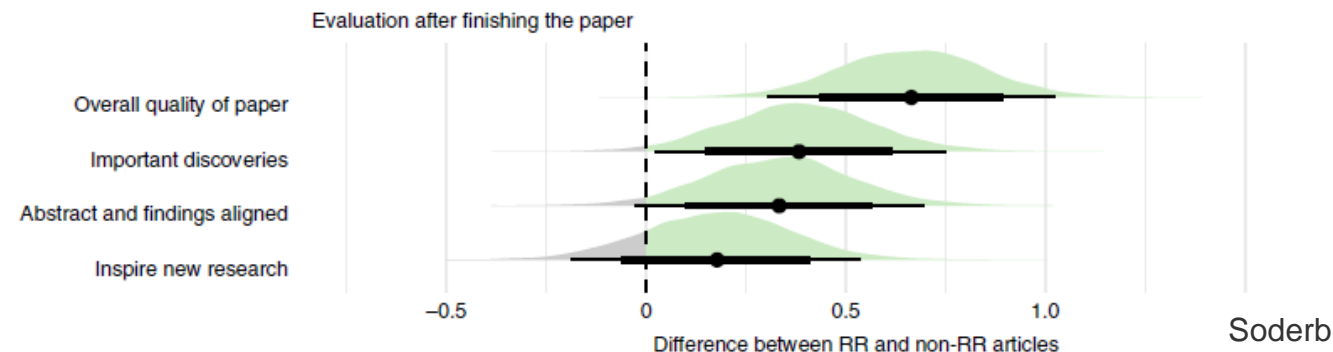
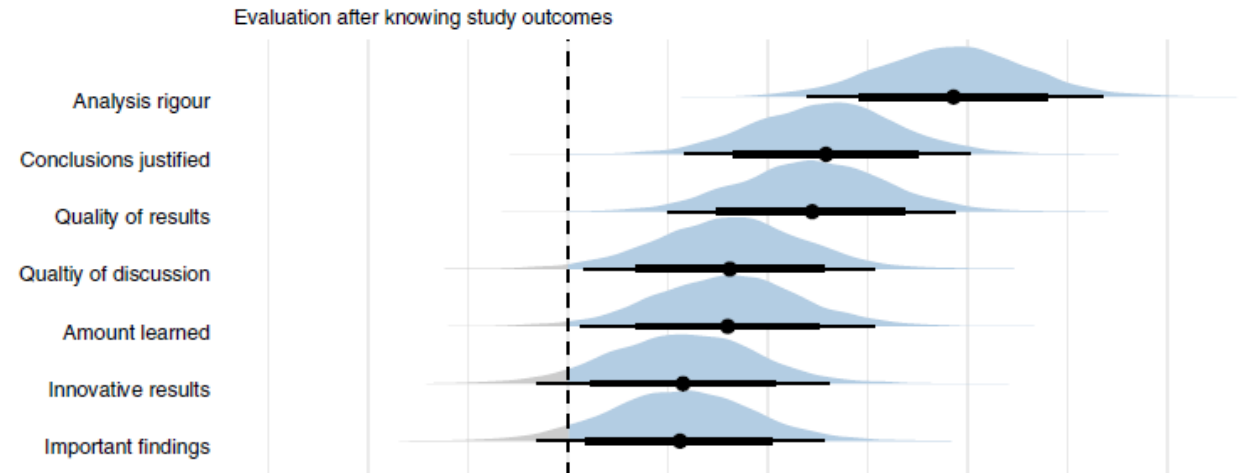
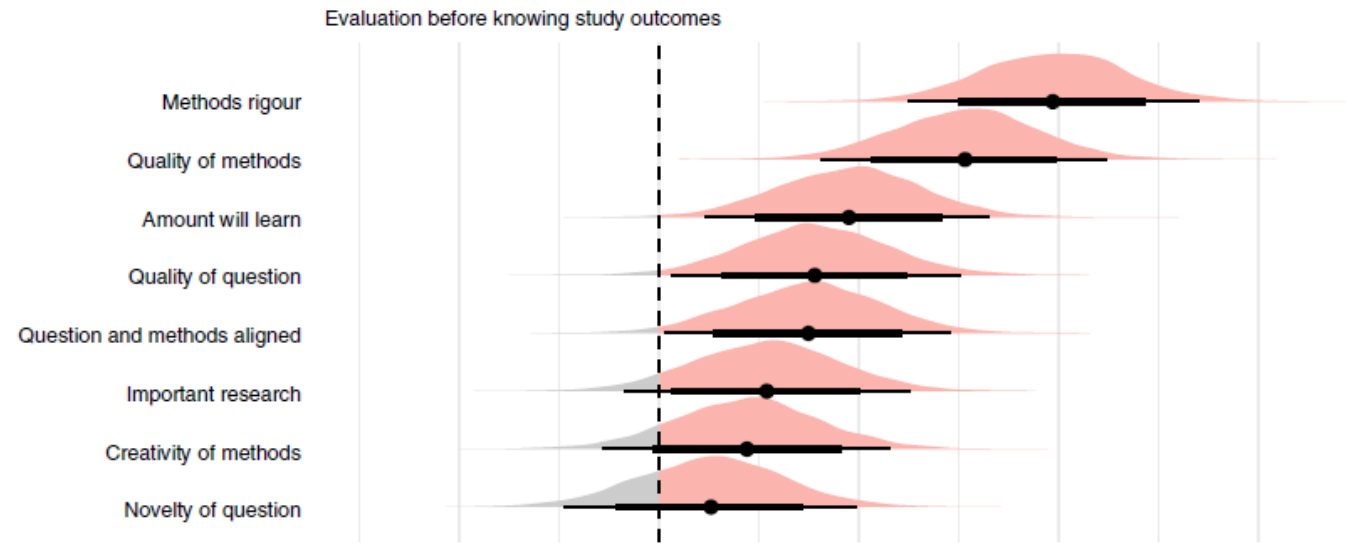


Currently, over **300** scientific journals use the Registered Reports publishing format either as a **regular submission option** or as part of a single **special issue**.

It works!



It works!



RR – Registered Reports
non-RR – Standard Reports

Tema: Registrert rapport

Her kan du lese mer om Stiftelsen Dams satsning på
registrert rapport.

Registered Report: peer-reviewed preregistration (stage 1) and article (stage 2) in a journal

Preregistration: not peer-reviewed research plan, time-stamped on an online platform

Preregistration works ...even when not followed

Article | [Published: 02 March 2022](#)

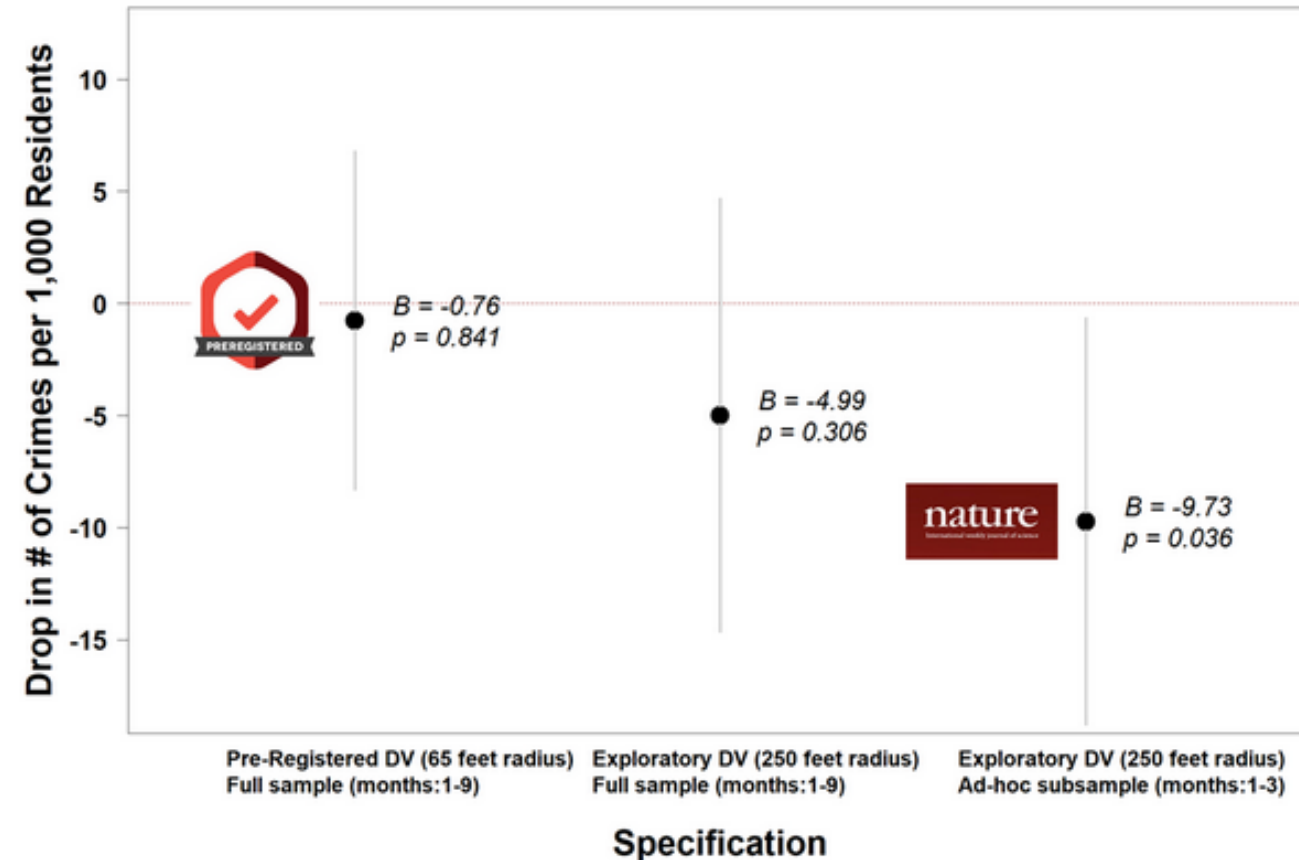
Knowledge about others reduces one's own sense of anonymity

[Anuj K. Shah](#) & [Michael LaForest](#)

Nature **603**, 297–301 (2022) | [Cite this article](#)

5586 Accesses | 1 Citations | 181 Altmetric | [Metrics](#)

- 1) All p-values mentioned are reported in the paper and/or its supplement. The authors **did not hide those results**.
- 2) There is **nothing wrong** with focusing on different outcomes than those preregistered. These are justifiable decisions.
- 3) What is wrong – not ethically, but mathematically – is **choosing which analyses to report or emphasize based on the results** that were obtained, and then taking the resulting p-values at face value.



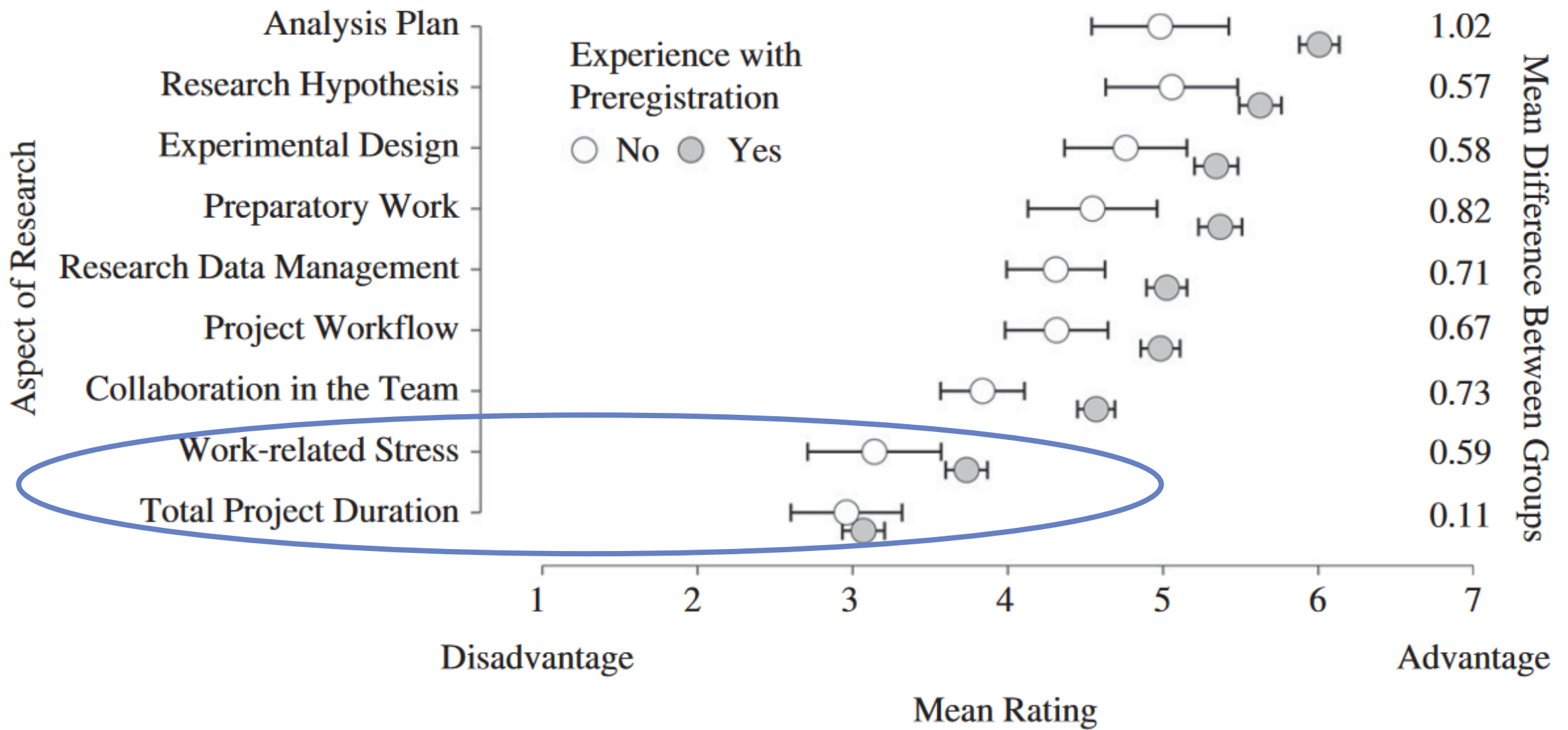
Transparency makes research
evaluable

The benefits

- Increased research **transparency**
- More visibility to **null results**
- More **visibility to research ideas and plans** early in the process
- More **trust** in research studies (through reduced biases)
- Clearer **distinction** between confirmatory and exploratory research as well as *a priori* and *post hoc* analyses
- Reduced redundancy of research studies?

The selfish benefits

- You will be more **transparent** about your research and analyses plans (and increase **trust** in your work)
- You will be encouraged to **think more deeply** about research design and planned analyses before collecting data
- You can claim early **credit** for your research ideas
- You will increase the **visibility** of your research and odds of getting **published** (despite the negative or “boring” findings)
- You will be more competitive on the **academic job market** (more and more listings mention scientific transparency and open science practices) and for **grant applications**



The challenges

- **More time** required at the planning phase (but less time required at the analysis and writing stage!)
- Higher **visibility of errors** (e.g., if wrong types of analyses are preregistered)
- **Less flexibility** (however, changes to preregistration are possible)
- Writing preregistration may improve study design and analyses, but there is **no quality stamp**

The myths

- It prevents **exploratory** research
- It limits research **creativity** or **flexibility**
- It might lead to others **scooping** my idea and my research plan
- There is no way to decide on data processing and analysis **without looking at the data**

How to preregister research?

A primer

Step 1: Choose the platform and the template

Focus	Type of research	Platform	Template
Discipline-specific	Clinical research	clinicaltrials.gov	Generic
		clinicaltrialsregister.eu	
	Animal research	animalstudyregistry.org	Generic
	Economics/Social sciences	socialscienceregistry.org	Generic
	Systematic reviews in health-related research	www.crd.york.ac.uk/prospero/	Generic
Discipline-general	Basic research	aspredicted.org	Generic
		osf.io/registries	Structured, Unstructured, Qualitative research, Replications, etc.

Step 2: Write up!

- **Think through** your research questions and/or hypotheses, your methods and/or planned statistical analyses
- Be **precise** about your exclusion criteria, stopping rule, handling missing data and outliers
- **Try out** your methods and planned analyses in a pilot study or on mock data
- Think about possible **unexpected scenarios**

Step 2: Write up!

We are interested in testing group differences.



We hypothesize that groups A and B will differ in condition X based on...



Step 2: Write up!

We will exclude inattentive participants.



We will exclude participants who did not pass 2 out of 3 control questions.



Step 2: Write up!

We will remove outliers.



We will remove influential observations identified through Cook's Distance analysis.



Step 3: Register and time-stamp!



You can decide whether you want your preregistration to be open to public or closed until the results are published.



Step 4: Changes to preregistration

- Even the best plans might need **changes** once implemented
- When reporting deviations from the original, preregistered plan, be **explicit** about what has changed
- If needed, you can upload changes to your time-stamped preregistration or preregister a new plan (but refer to the original preregistration and explain why you made the changes)

How to get the most out
of preregistration?

Preregistering quantitative vs qualitative studies

Quantitative research: have the right confirmatory analyses been carried out based on original hypotheses?

Qualitative research: have the right data collection and analysis methods been used? Is the interpretation convincing, based on original theoretical framework and planned methodology?

Preregistration will look different depending on scientific discipline or the type of research study.

Choose **the right template** for your preregistration.

Take a look at **preregistration examples** for similar studies before you write up yours.

Consult your **colleagues** if they have experience with preregistration in your field.



Preregistering qualitative research

Tamarinde L. Haven ^a and Dr. Leonie Van Grootel ^b

<https://www.tandfonline.com/doi/full/10.1080/08989621.2019.1580147>

Preregistration of exploratory research: Learning from the golden age of discovery

Ulrich Dirnagl

Published: March 26, 2020 • <https://doi.org/10.1371/journal.pbio.3000690>

<https://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.3000690>

Theoretical-review Articles

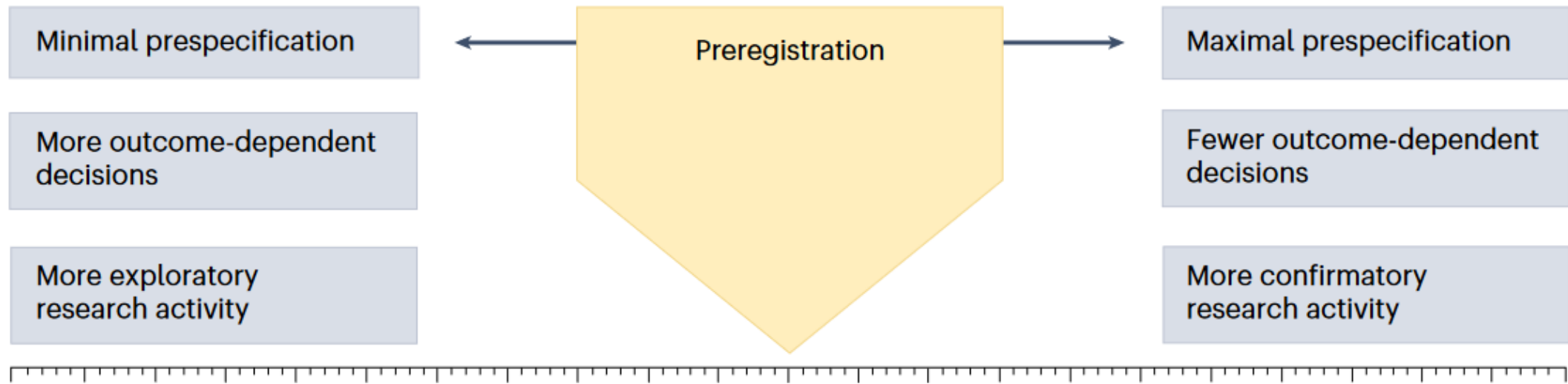
Preregistration of Analyses of Preexisting Data

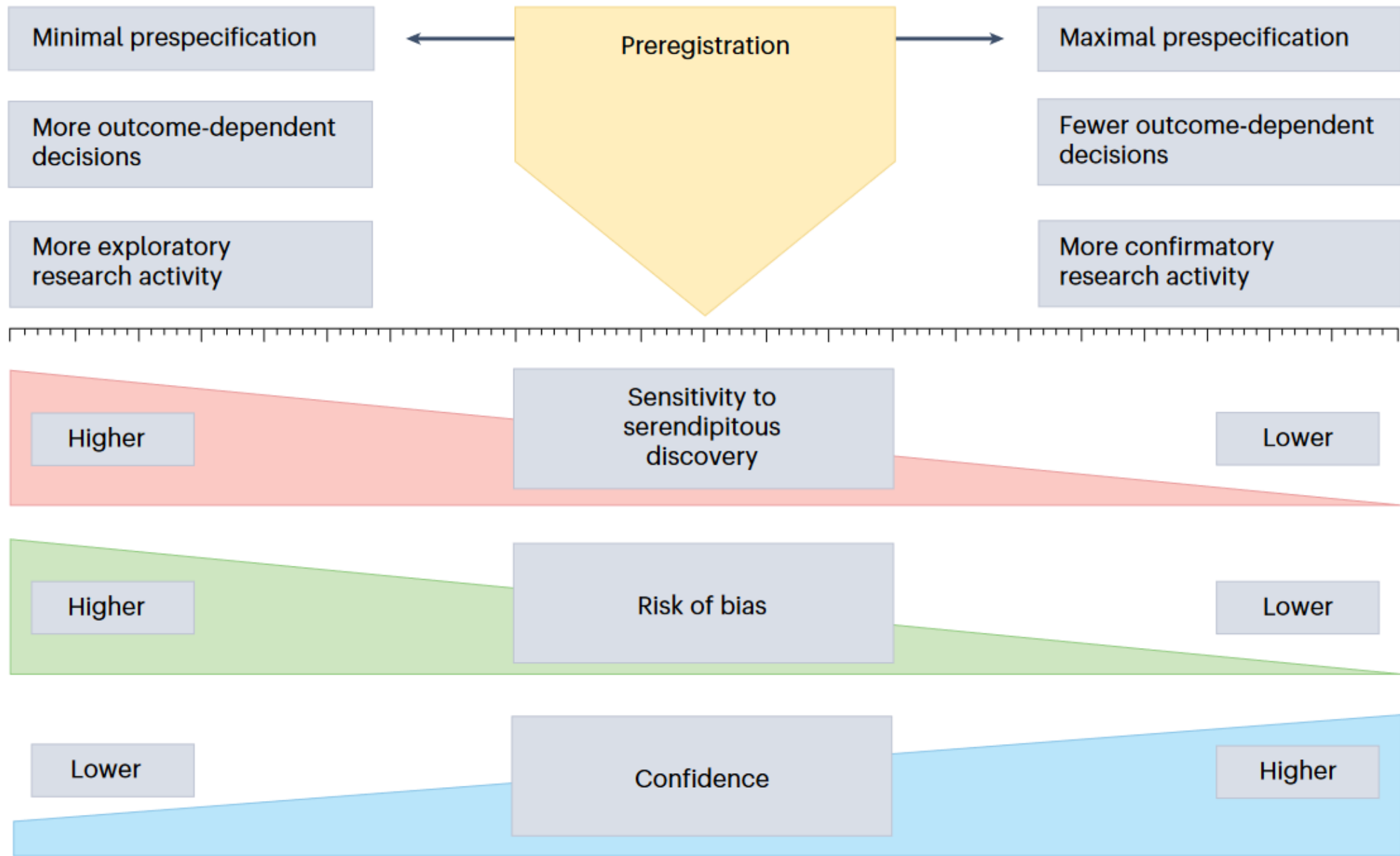
Authors: Gaëtan Mertens , Angelos-Miltiadis Kryptos

<https://www.psychologicabelgica.com/articles/10.5334/pb.493/>

Preregistration is a plan, not a prison.

Remember that you can make changes to the preregistration or report non-preregistered findings, as long as you are explicit about what was planned and what was not planned.





Let's try it on OSF!



What is OSF?



Free, discipline-general platform that helps researchers:

- manage
- document
- share

their research plans, outputs and workflows



The open registries network

Add New Registration

You are submitting to OSF Registries. [Click here](#) to learn more about other hosted registries.

STEP 1

Do you have content for registration in an existing OSF project?

YES

NO

STEP 2

Which type of registration would you like to create? *

- OSF Preregistration ▲
- OSF Preregistration ▲
- Open-Ended Registration
- OSF-Standard Pre-Data Collection Registration
- Pre-Registration in Social Psychology (van 't Veer & Giner-Sorolla, 2016): Pre-Registration
- Preregistration Template from AsPredicted.org
- Qualitative Preregistration ▼

Let's try it on OSF!



Go to: <https://osf.io/>

Almost done...



Remember:

- Do not edit any files until the registration has completely archived.
- This will be permanent and cannot be deleted once submitted.
- This registration will be copied to Internet Archive as a backup.
- Title and contributors cannot be updated once submitted.

Make registration public immediately

Enter registration into embargo

Submit

Back

[Norwegian version of this page](#)

Digital Scholarship Centre

At the Digital Scholarship Centre (DSC) you get guidance on how you can make the best possible use of digital tools and methods in your research and communication activities.

Open Access →

Information about open access publishing, publisher agreements, self-archiving, requirements, and guidelines.

Open and reproducible research →

Make your research more transparent and reproducible.

Research Data Management →

Managing your data both during and after a research project.

Text-mining →

Information about digital tools for searching, mining, and analysing textual data.

Systematic search →

Information about systematic literature searching, how to get started, and how to get help.

Visualisation →

Use of visual methods to explore, communicate and understand data.

Carpentry@UiO →

Offers workshops in foundational digital skills such as coding and data management.

Reference management →

Styles, tools, and information on reference management.

Open and reproducible research

[Norwegian
version of this
page](#)

Learn about how to make your research more open and reproducible and get involved in initiatives and communities that are interested in sharing and improving research at UiO.

Open research

Research methods

workshop-bilder

More and more researchers and students across disciplines are implementing open research practices, preregistering their hypotheses, methods, and analysis plans and sharing research materials, data and analysis scripts. Digital Scholarship Center can help you learn about and implement these practices in your own research as well as advise on the policies and requirements from funders.

Open Science Lunch →

Every last Thursday of the month we meet at noon to discuss topics related to open research.

ReproducibiliTea@UiO →

Join us for a Journal Club where we read and discuss papers on open research and meta-science.

Norwegian Reproducibility Network →

Join a broader community that aims to promote and enable rigorous, robust and transparent research practices in Norway

Courses and workshops →

Click here for the list of upcoming and previous courses and workshops on open and reproducible research at UiO.



Open Science Lunch

Each last Thursday of the month at 12:00 we invite you to join us for a lunch seminar to hear about how to make your research more open. We will discuss research transparency and visibility, open publishing, data sharing, and more!

Upcoming

Time and place: Apr. 25, 2024 12:00 PM – 1:00 PM, Zoom

Researcher Assessment

Join us for this Open Science Lunch to learn about the work on reforming research assessment in Norway and hear about experiences from implementing the CoARA commitments.

ReproducibiliTea

Journal Club

**JOIN IN AND DISCUSS WITH FELLOW
STUDENTS AND RESEARCHERS**

**OPEN RESEARCH, REPRODUCIBILITY
and RESEARCH IMPROVEMENT**



Join us

Everyone is welcome to join us - whether you are an enthusiast of open and reproducible research, a skeptic, or a cautious explorer. Currently, all meetings are hybrid with the possibility of joining on-site at Blindern or via Zoom. Grab a cup of tea (coffee?) and join us!

Subscribe to our mailing list



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en del av Universitetsbiblioteket i Oslo

The Digital Scholarship Centre's Newsletter,
part of the University of Oslo Library

DSC NEWS

Senter for digitalforskerstøtte
Digital Scholarship Centre



<https://sympa.uio.no/ub.uio.no/subscribe/dsc-news/subscribe>

Thank you!



- Choose the right **template** for your preregistration.
- Take a look at preregistration **examples** for similar studies before you write up yours and consult your **colleagues**
- Remember that you can make **changes** to the preregistration or report non-preregistered findings, as long as you are **explicit** about what was planned and what was not planned.

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References

- Carney DR, Cuddy AJC, Yap AJ. Power Posing: Brief Nonverbal Displays Affect Neuroendocrine Levels and Risk Tolerance. *Psychological Science*. 2010;21(10):1363-1368. doi:[10.1177/0956797610383437](https://doi.org/10.1177/0956797610383437)
- Devezer B., Navarro D. J., Vandekerckhove J. and Ozge B. E.(2021). The case for formal methodology in scientific reform. Royal Society Open Science. <https://doi.org/10.1098/rsos.200805>
- Fanelli, D. (2010). Positive' results increase down the hierarchy of the sciences. *PLOS One*, 5. <https://doi.org/10.1371/journal.pone.0010068>
- Hardwicke T.E., Ioannidis J.P.A. (2018). Mapping the universe of registered reports. *Nature Human Behavior*, 2, 793–796. <https://doi.org/10.1038/s41562-018-0444-y>
- Ioannidis, J.P.A. (2005). Why Most Published Research Findings Are False. *PLOS Medicine* 2(8): e124. <https://doi.org/10.1371/journal.pmed.0020124>
- Ioannidis, J.P.A. (2022). Pre-registration of mathematical models. *Mathematical Biosciences*, 345. <https://doi.org/10.1016/j.mbs.2022.108782>
- Kathawalla, U.-K., Silverstein, P., & Syed, M. (2021). Easing Into Open Science: A Guide for Graduate Students and Their Advisors. *Collabra: Psychology*, 7(1), 18684. <https://doi.org/10.1525/collabra.18684>
- Kerr N. (1998). HARKing: hypothesizing after the results are known. *Personality and Social Psychology Review*, 2, 196–217. https://doi.org/10.1207/s15327957pspr0203_4
- Lindsley, K., Fusco, N., Li, T., Scholten, R., Hooft, L. (2022). Clinical trial registration was associated with lower risk of bias compared with non-registered trials among trials included in systematic reviews. *Journal of Clinical Epidemiology*, 145. <https://doi.org/10.1016/j.jclinepi.2022.01.012>
- Markowetz F. (2015). Five selfish reasons to work reproducibly. *Genome Biology*, 16, 274. <https://doi.org/10.1186/s13059-015-0850-7>
- Munafò, M., Nosek, B., Bishop, D., Button, K., Chambers, C., Percie du Sert, N., et al. (2017). A manifesto for reproducible science. *Nature Human Behavior*, 1, 0021. <https://doi.org/10.1038/s41562-016-0021>
- Nosek BA, Beck ED, Campbell L, Flake JK, Hardwicke TE, Mellor DT, van 't Veer AE, Vazire S. Preregistration Is Hard, And Worthwhile. *Trends Cogn Sci*. 2019 Oct;23(10):815-818. <https://doi.org/10.1016/j.tics.2019.07.009>
- Nosek, B., Ebersole, C.R., DeHaven, A.C., Mellor, D.T. (2018). The preregistration revolution, *PNAS*, 201708274. <https://doi.org/10.1073/pnas.1708274114>
- Nosek, B., & Lindsay, S. (2018). Preregistration Becoming the Norm in Psychological Science. *APS Observer*, 31. <https://www.psychologicalscience.org/observer/preregistration-becoming-the-norm-in-psychological-science>
- Nuzzo R. (2015). How scientists fool themselves—and how they can stop. *Nature*; 526: 182–185. <https://doi.org/10.1038/526182a>
- Rosenthal, R. (1979). The file drawer problem and tolerance for null results. *Psychological Bulletin*, 86(3), 638–641. <https://doi.org/10.1037/0033-2909.86.3.638>
- Sarafoglou, A. (2021). Confirmatory versus Exploratory Analysis. *SIOS Lecture*. <https://osf.io/gnkvh/>
- Scheel A.M., Schijen M., Lakens D. (2021) An Excess of Positive Results: Comparing the Standard Psychology Literature With Registered Reports. *Advances in Methods and Practices in Psychological Science*. <https://doi.org/10.1177/25152459211007467>
- Schönbrod, F. (2021). An introduction to Open Science. Doing transparent, credible and efficient research. <https://osf.io/vza25/>
- Soderberg, C.K., Errington, T.M., Schiavone, S.R. et al. Initial evidence of research quality of registered reports compared with the standard publishing model. *Nat Hum Behav* 5, 990–997 (2021). <https://doi.org/10.1038/s41562-021-01142-4>
- Szollosi A, Donkin C. Arrested Theory Development: The Misguided Distinction Between Exploratory and Confirmatory Research. *Perspectives on Psychological Science*. 2021;16(4):717-724. doi:[10.1177/1745691620966796](https://doi.org/10.1177/1745691620966796)
- Szollosi, A., Kellen, D., Navarro, D. J., Shiffrin, R., van Rooij, I., Van Zandt, T., & Donkin, C. (2020). Is preregistration worthwhile? *Trends in Cognitive Sciences*, 24(2), 94–95. <https://doi.org/10.1016/j.tics.2019.11.009>
- Wagenmakers, E.J., Dutilh, G. (2016). Seven Selfish Reasons for Preregistration. *APS Observer*, 29 <https://www.psychologicalscience.org/observer/seven-selfish-reasons-for-preregistration>
- Warren, M. (2018). First analysis of 'pre-registered' studies shows sharp rise in null findings. *Nature*. <https://doi.org/10.1038/d41586-018-07118-1>