

Preregistration of research studies

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Roadmap

- Why should we consider preregistration?
- What is preregistration?
- The benefits and challenges of preregistrations
- How to preregister research? A primer
- How to get the most out of preregistration?
- 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](#)

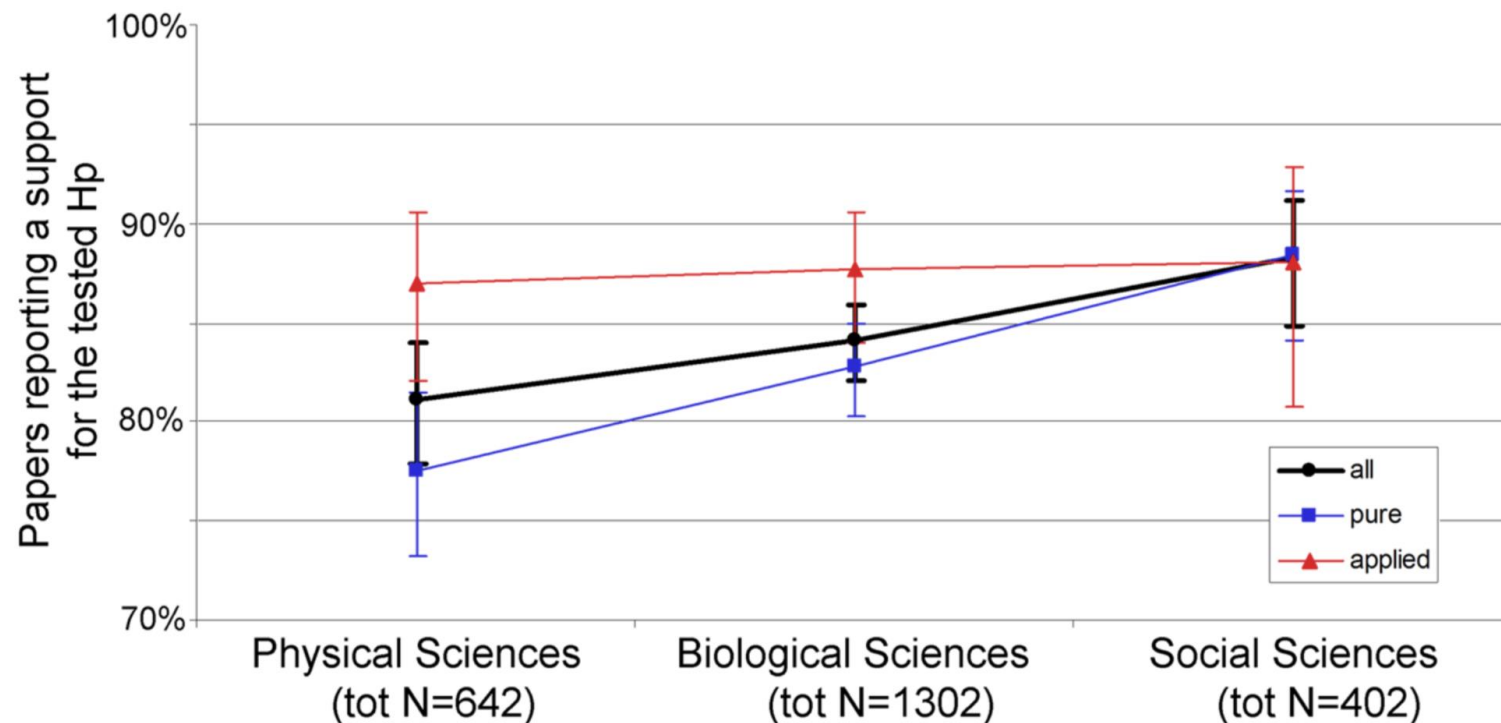
Negative or “boring” results are less likely to be published

(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.

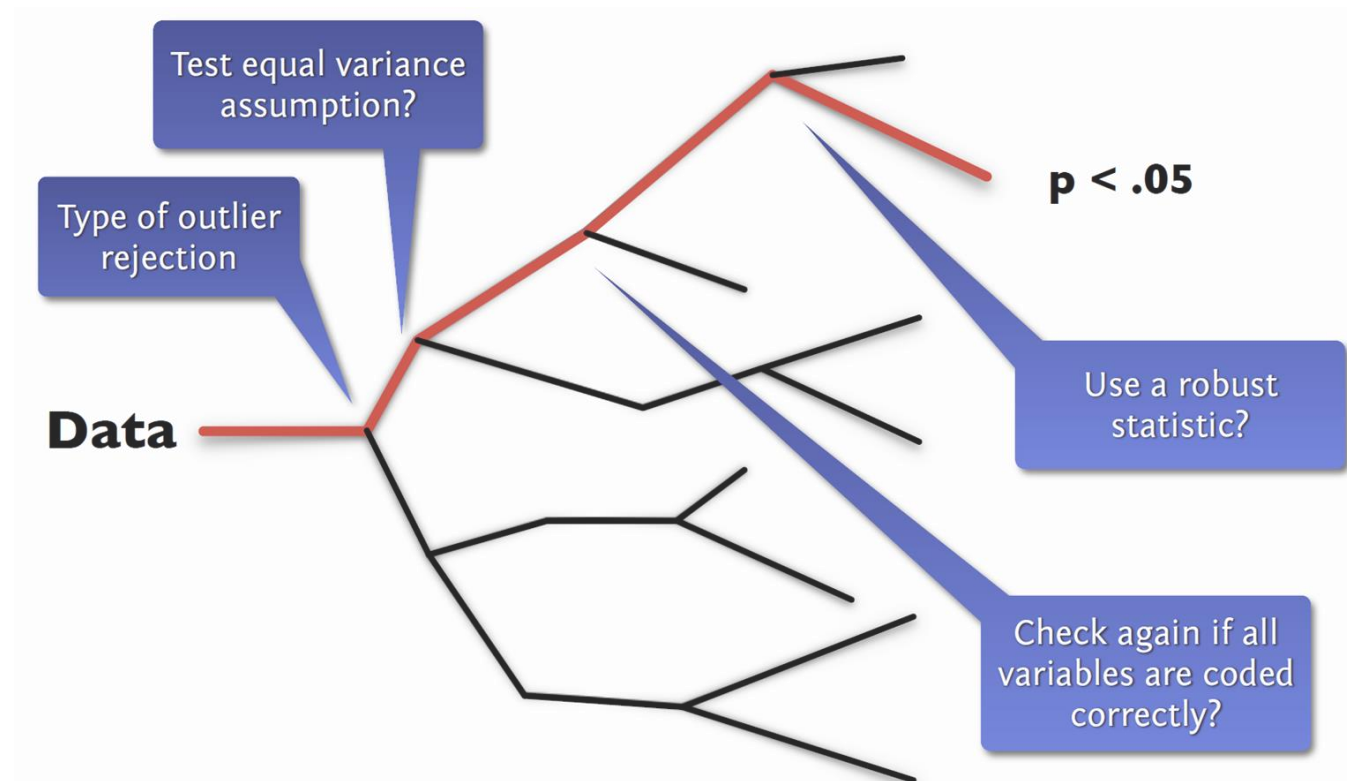
Researchers are biased and make arbitrary decisions

(also called “Researcher degrees of freedom”)



Researchers are biased and make arbitrary decisions

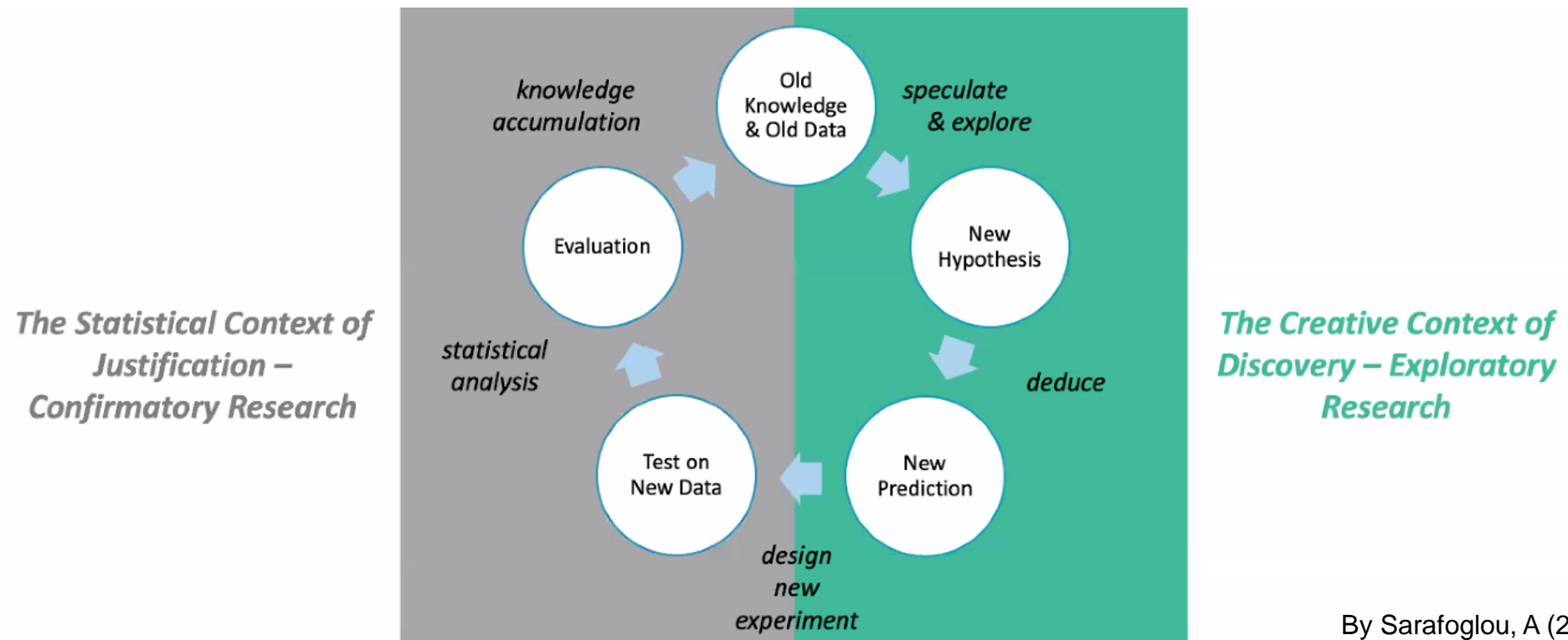
(also called “Researcher degrees of freedom”)



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



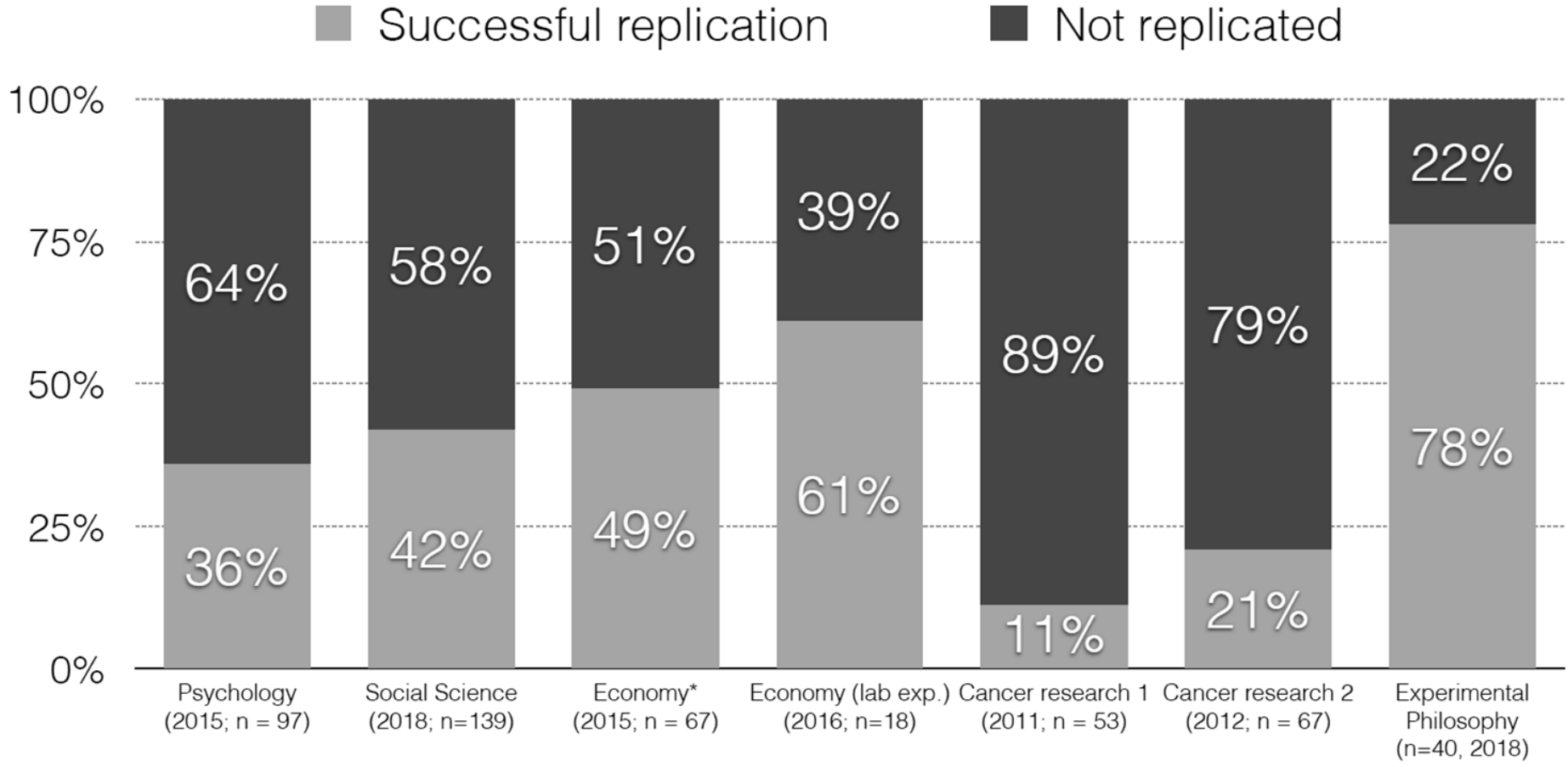
Researcher degrees of freedom



Confirmatory vs exploratory research



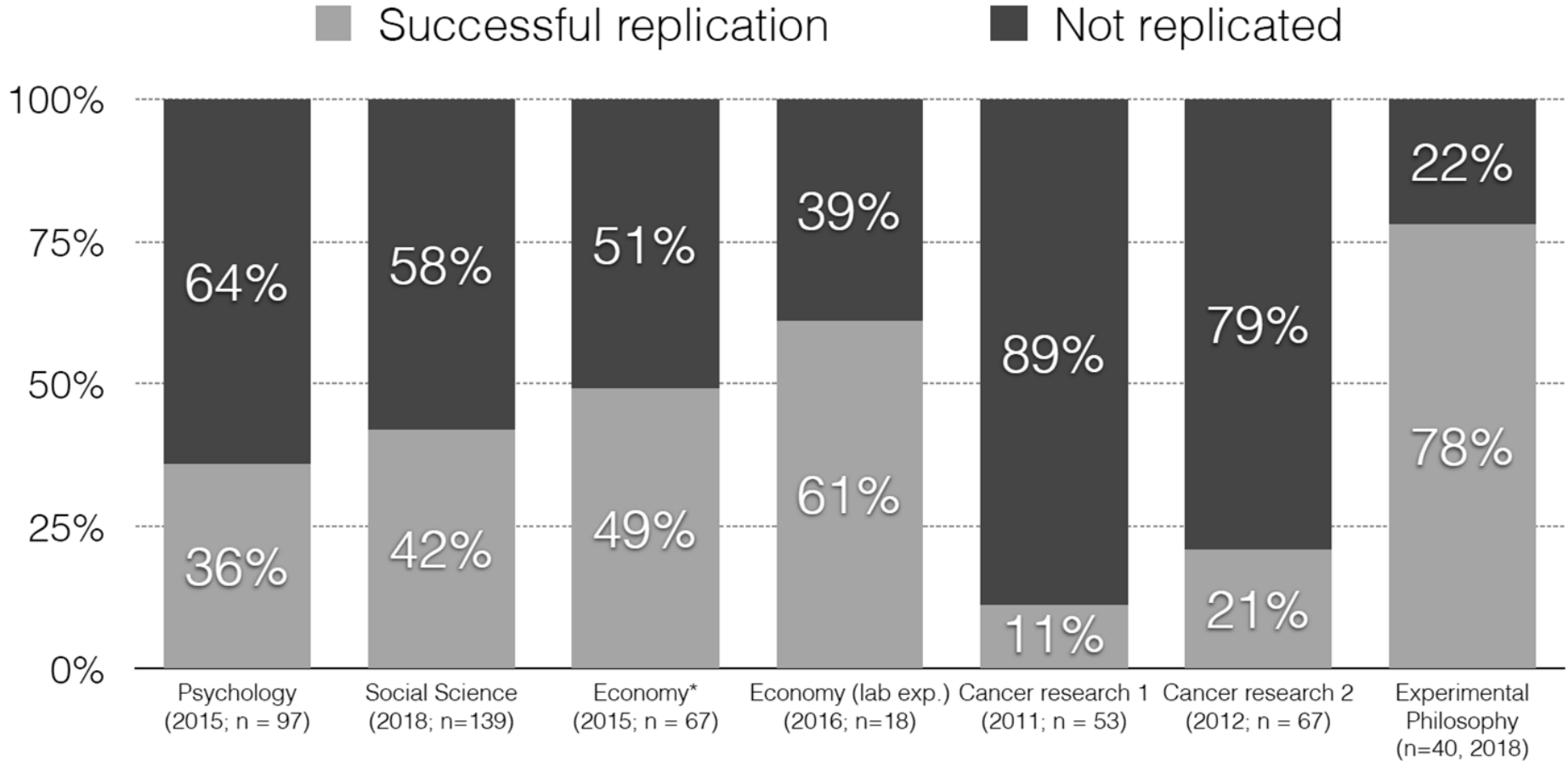
Replication crisis?



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

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**Why Should I Register and
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[FDAAA 801 and the Final
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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?

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- [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}

^a*Julius Center for Health Sciences and Primary Care, University Medical Center Utrecht, Utrecht University, Utrecht, The Netherlands*

^b*Cochrane Netherlands, University Medical Center Utrecht, Utrecht University, Utrecht, The Netherlands*

^c*Xcenda, LLC, Boston, MA*

^d*Department 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



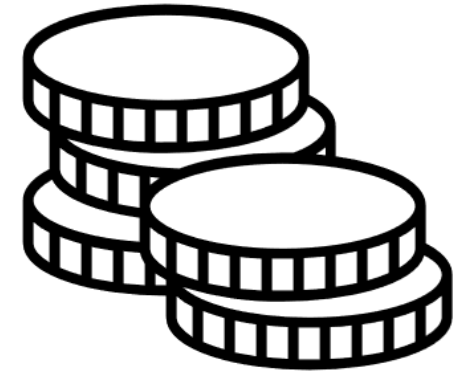
Study design and data
collection methods



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

Voice onset time in Norwegian infant-directed speech over development

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

Preregistration vs Registered Report



Preregistration vs Registered Report



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

Preregistration vs Registered Report

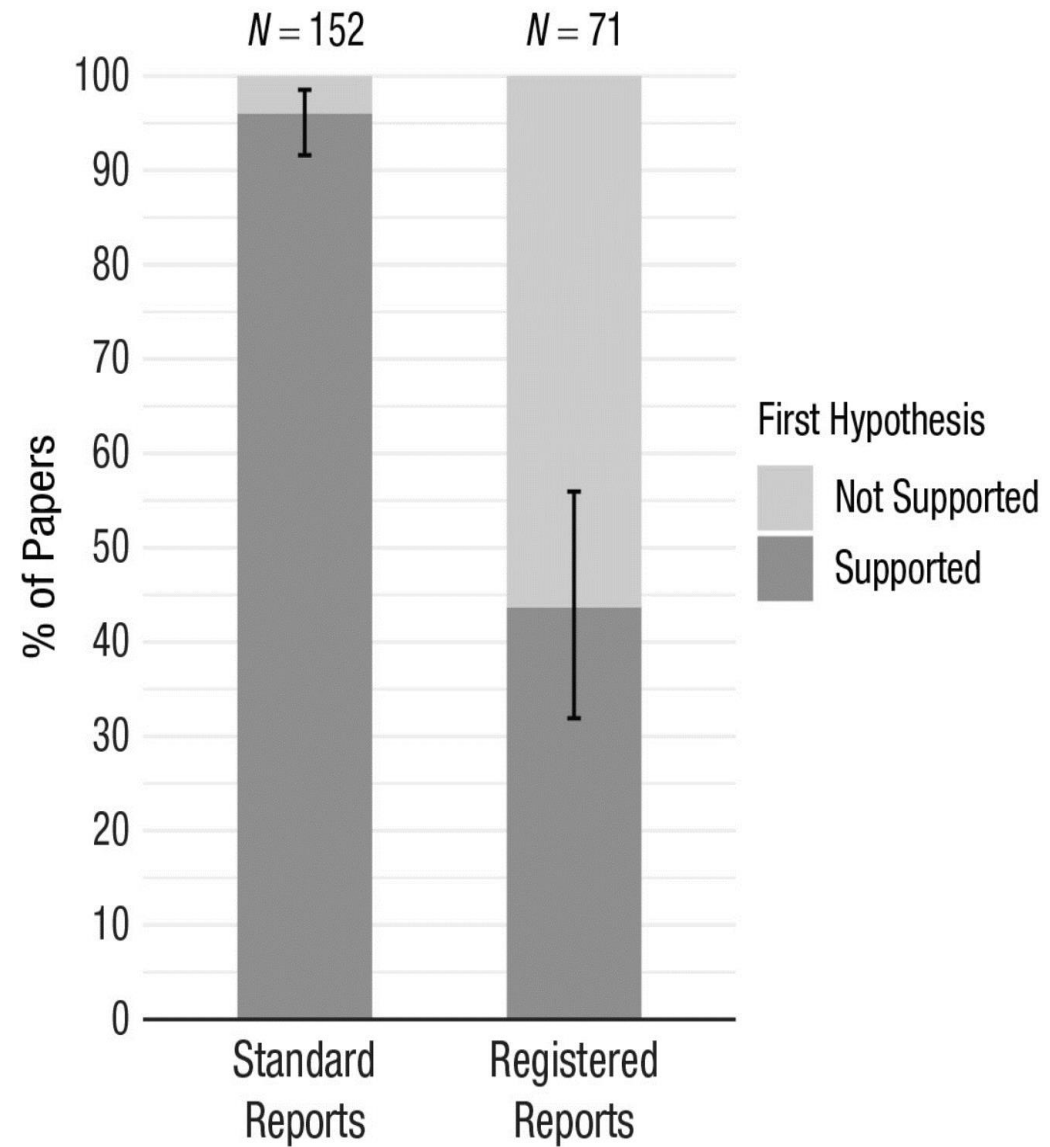


Preregistration vs Registered Report

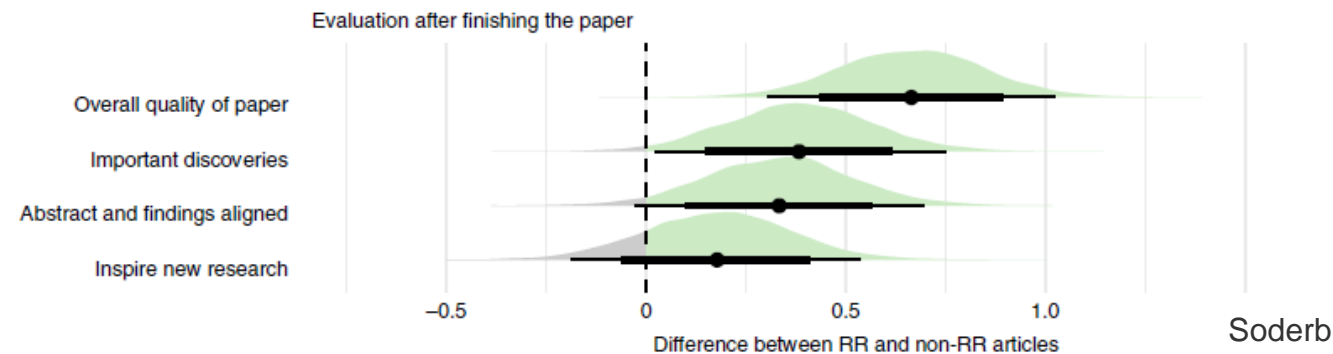
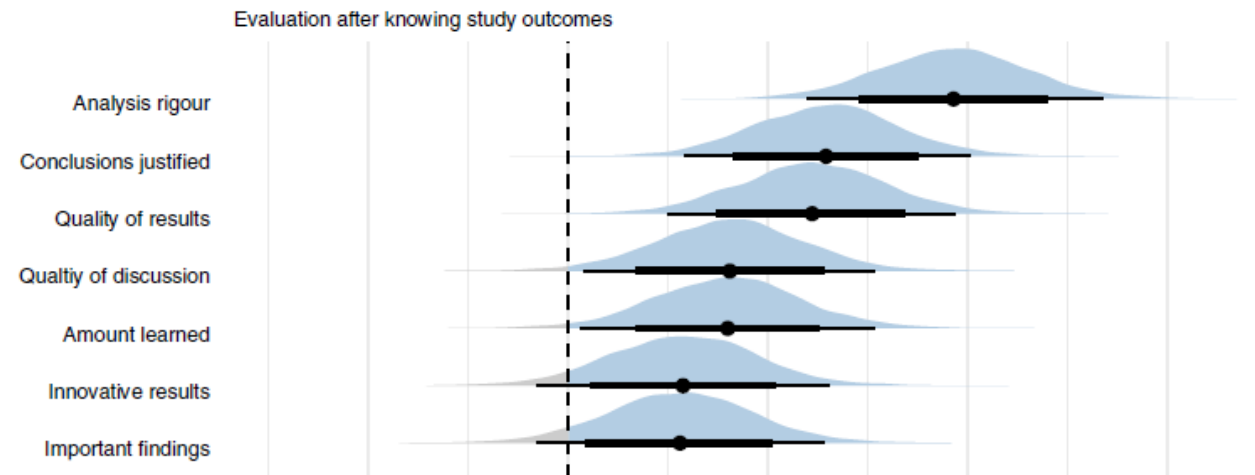
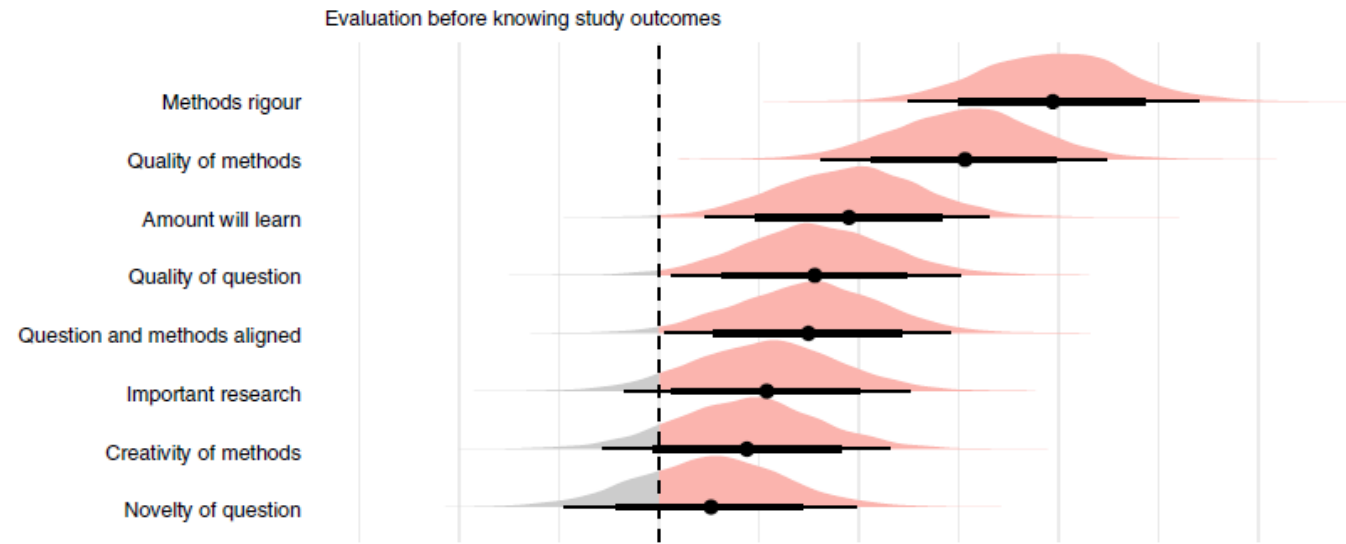


Currently, over **300** scientific journals use the Registered Reports publishing format either as a **regular submission option** or as part of a single **special issue**.

It works!



It works!



RR – Registered Reports
non-RR – Standard Reports

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](#)

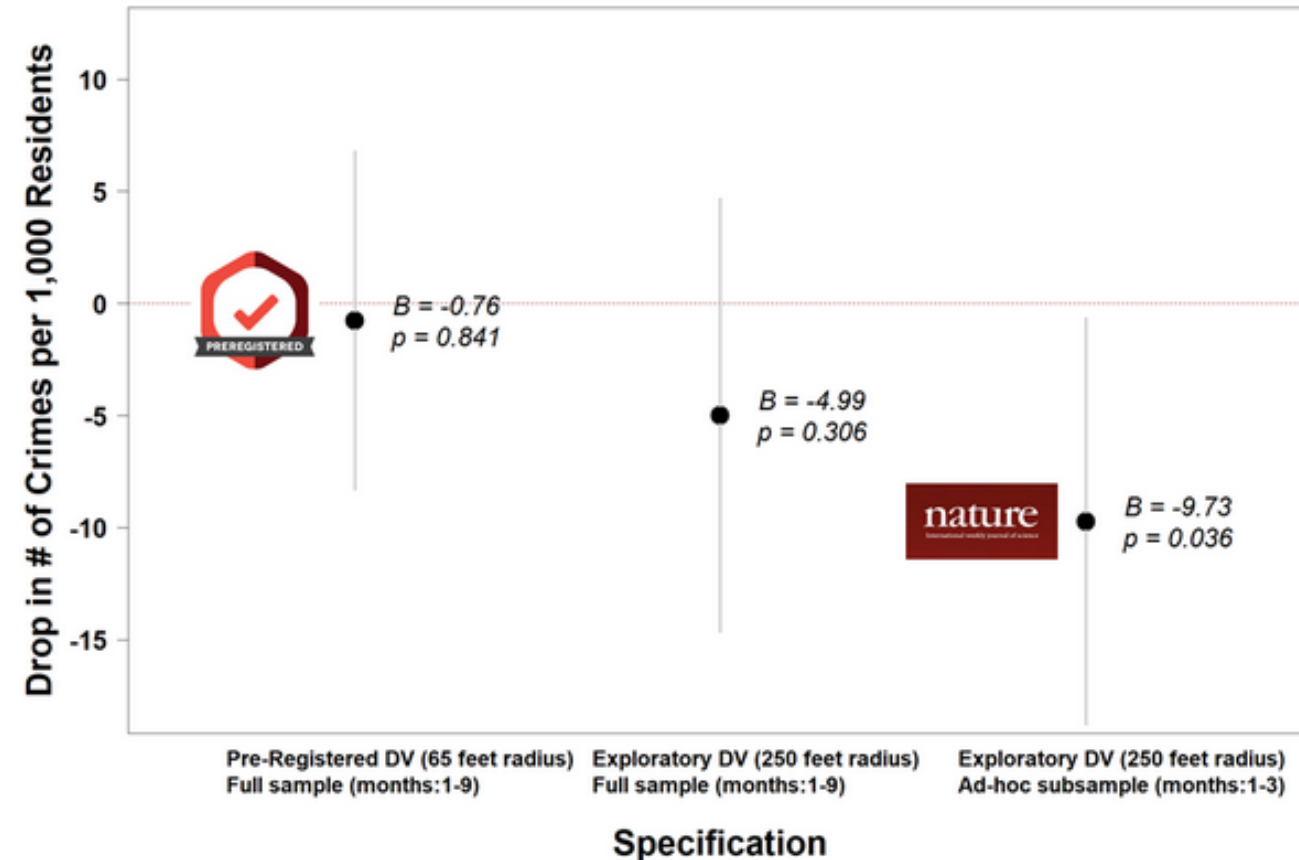
Knowledge about others reduces one's own sense of anonymity

[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.



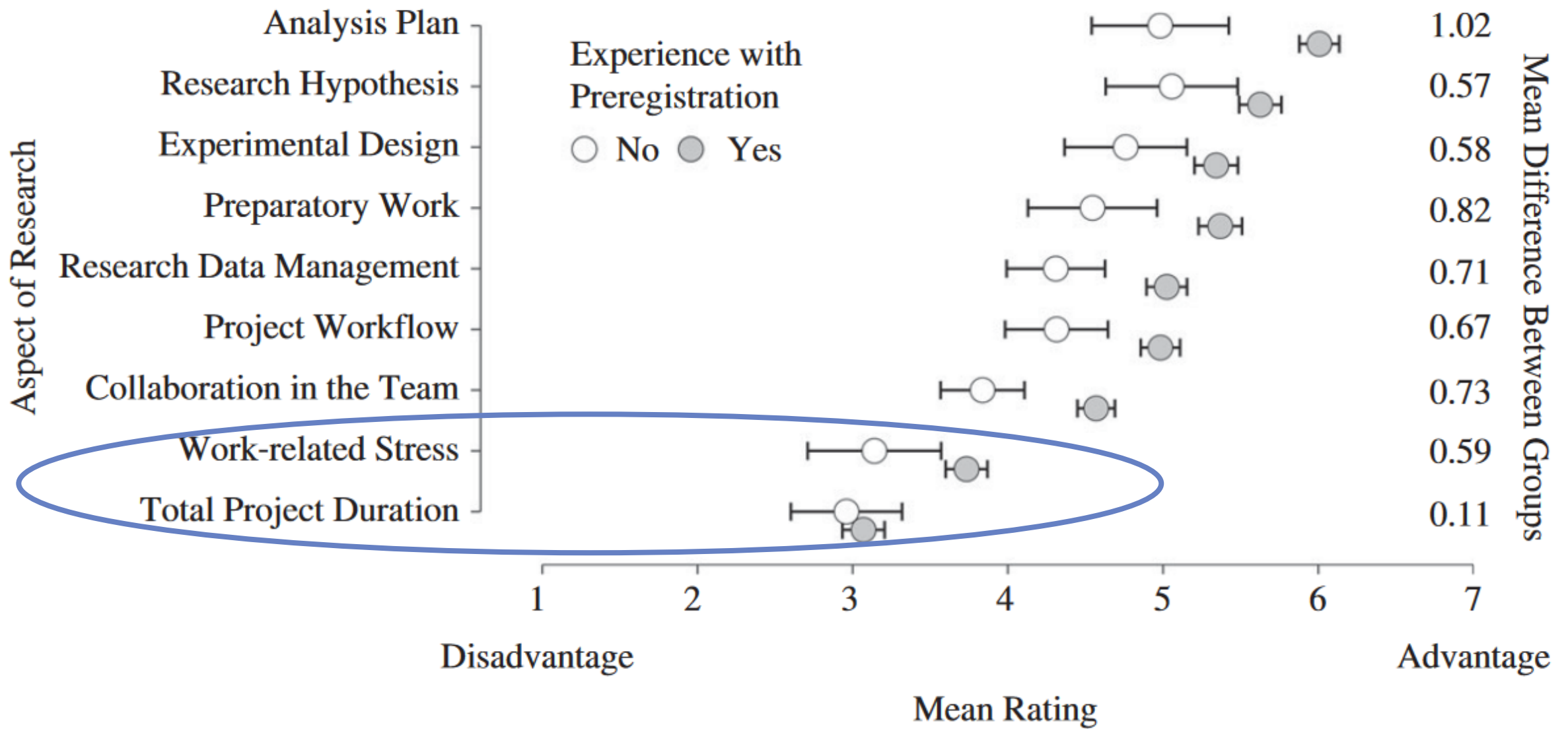
Transparency makes research
evaluable

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
	Animal research	animalstudyregistry.org	Generic
	Economics/Social sciences	socialscienceregistry.org	Generic
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		osf.io/registries	Structured, Unstructured, Qualitative research, Replications, etc.

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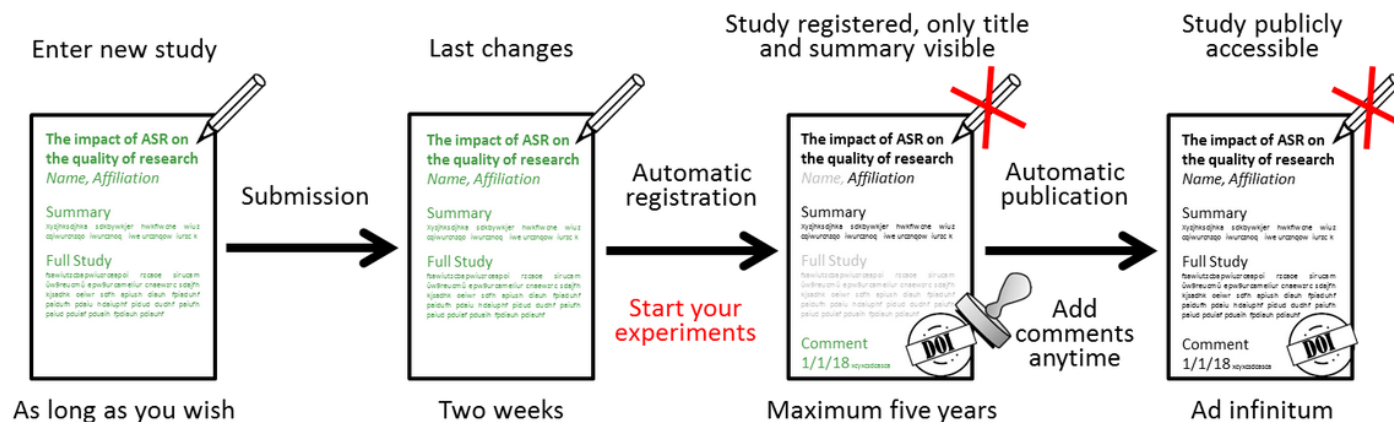
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Animal Study Registry

Animal Study Registry is an online registry for scientific studies involving animals conducted around the world. It is operated by the [German Centre for the Protection of Laboratory Animals \(Bf3R\)](#) at the [German Federal Institute for Risk Assessment \(BfR\)](#). The registry was launched as a reaction to the reproducibility crisis and provides scientists a platform to register an exact study plan prior to the start of experiments in order to prevent selective reporting. This allows reviewers or other scientists to compare the initially registered contents with the final publication. Thereby, Animal Study Registry encourages transparency, reproducibility, and animal welfare.

Register your study in Animal Study Registry

Take all the time you need to prepare the registration of your study in Animal Study Registry. As long as your study is in preparation, you can save all changes and come back to it anytime you want. Once your study is submitted, you can still decide to change or retract it within two weeks from the submission date. After this period, the registration becomes binding and your study receives a DOI (Digital Object Identifier) number which marks your study as your intellectual property. From this date on you can only add comments to your study. Our platform allows registration of a study without making it immediately publicly accessible. You can restrict the visibility of your study for a period of up to five years. During this embargo period, your study will appear in Animal Study Registry only with its title, your institution and optionally your name, accompanied by a short summary. At the end of the embargo period, your study will automatically become fully publicly accessible. Please have a look at our sample study [10.17590/asr.0000091](https://www.animalstudyregistry.org/10.17590/asr.0000091).



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REGISTRATION GUIDELINES

[REGISTER A TRIAL >](#)

Please review these instructions before beginning a trial registration.

Accounts

You will need a valid account to register a trial. To create an account go to the [Sign Up](#) page.

Trial Registration

Once you have a valid account, you can register a trial at the [Trial Registration](#) page. The person registering the trial is considered to be the primary principal investigator (PI). For studies with additional PIs, there are additional fields to enter their names, emails and affiliations. Email addresses are hidden from public view.

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Create a new pre-registration

[CREATE](#)

Just trying it out; make this pre-registration self-destroy in 24 hours. 

See your pre-registrations

(e.g., to share with reviewers or make public)

[I cannot access my AsPredicted email account anymore](#)

[Sign in](#)

WHAT IS ASPREDICTED?

AsPredicted is a platform that makes it easy for researchers to pre-register their studies, and easy for others to read and evaluate those pre-registrations. To pre-register a study on AsPredicted, a researcher answers nine simple questions about their research design and analyses. The platform then generates a time-stamped, single page .pdf document that includes a unique URL for verification.

HOW DOES IT WORK?

- One author creates the pre-registration.
- Participating authors are emailed, requesting approval.
- If all approve, it is saved but remains private until an author makes it public; or remains private forever. [\(Why?\)](#)
- Authors may share an anonymous version of the pre-registration with reviewers.
- If made public, the final .pdf ([sample](#)) is automatically stored in the [web-archive](#).

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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 ▼

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Step 2: Write up!

- **Think through** your hypotheses, methods, and planned statistical analyses very carefully
- 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.

Reviews

Preregistering qualitative research

Tamarinde L. Haven   & Dr. Leonie Van Grootel 

Pages 229-244 | Accepted author version posted online: 11 Feb 2019, Published online: 01 Mar 2019

 Download citation  <https://doi.org/10.1080/08989621.2019.1580147>



<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

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.

More hands-on guidance?



Time and place: Oct. 21, 2022 9:00 AM–10:30 AM, Zoom [Add to calendar](#)

Preregistration on Open Science Framework (OSF)

Learn about how to preregister your study on Open Science Framework (OSF) and how to navigate the platform.

Open Access Week 2022



The image shows a beach heavily littered with plastic waste, including a white bucket, a blue cup, and various pieces of debris. In the background, there are palm trees and a clear blue sky. A large, semi-transparent logo for 'Open Access Week' is overlaid on the center of the image. The logo consists of a stylized 'O' and 'A' in a light blue color, with the words 'Open Access Week' in a smaller font below it. The logo is partially obscured by the trash on the beach.

 International
Open Access Week

OCTOBER 24-30, 2022

Open for Climate Justice

[#OpenForClimateJustice](https://www.ub.uio.no/english/courses-events/events/all-libraries/2022/open-access-week-2022.html)

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: Oct. 27, 2022 12:00 PM–1:00 PM, Hybrid: Georg Sverdrups hus and Zoom [Add to calendar](#)

Open Science Lunch: Enabling reuse of non-digital data

Learn about how we can increase reuse of non-digital data such as plants, fossils or organ tissues.



Time and place: Nov. 24, 2022 12:00 PM–1:00 PM, Hybrid: Georg Sverdrups hus and Zoom [Add to calendar](#)

Open Science Lunch: CRediT your co-authors

Learn about CRediT - a new international standard for transparent assignment of individual research contributions.

ReproducibiliTea

ReproducibiliTea is a global journal club initiative that focuses on discussing papers and ideas about improving science, reproducibility and open research. Our local ReproducibiliTea at the University of Oslo is open to both staff and students at UiO across all departments.



Subscribe to our mailing list: <https://sympa.uio.no/uio.no/subscribe/open-science-oslo>

Welcome to Norway's Reproducibility Network

Towards open & reproducible science

JOIN US

Our Mission

The Norwegian Reproducibility Network (NORRN) is a peer-led network that aims **to promote and enable rigorous, robust and transparent research practices in Norway**. We attempt to achieve this goal by establishing appropriate training activities, designing, and evaluating research improvement efforts, disseminating best practices, and working with stakeholders to ensure coordination of efforts across the sector. NORRN's activities span multiple levels, including researchers, librarians, institutions, and other stakeholders (e.g., funders and public authorities).

[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.

Thank you!

Questions?

Read more about preregistration on
PhD on track:

<https://www.phdontrack.net/open-science/preregistration/>

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Open Research group, University of Oslo Library

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