Do I really need to preregister?

An introduction to preregistration

Johanna Hein

Most of these slides are taken from

SIRRO Preregistration Workshop by Caro Hautekiet and Evie Vergauwe: https://osf.io/g45nt/

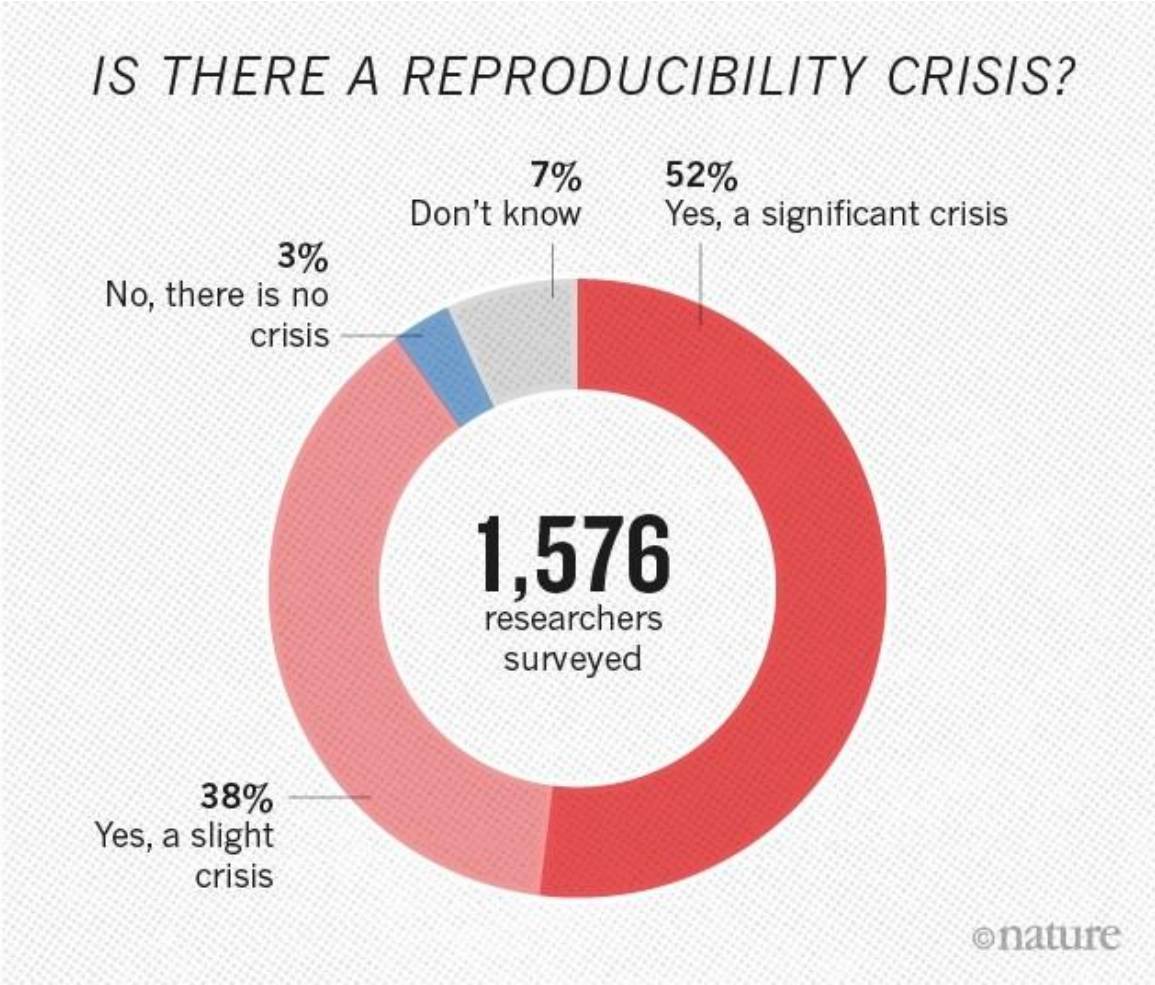
The slides were created with the help of

- Slides Talk “Preregistration in Psychological Science: Savior, Vaporware, or straight jacket by Malte Elson, UNIGE Reproducibility Day 2025
- 2023 CUSO Open Science Workshop by Dominique Roche: https://osf.io/4g8tk/
- Lecture Slides “Best Practice in Pedagogy” by William Chopik and colleagues https://osf.io/mh9pe/
- ”Easing Into Open Science: A Guide for Graduate Students and Their Advisors” (Kathawalla et al., 2021)
- “Seven Easy Steps to Open Science” (Crüwell et al., 2019)

Your experience with and worries about preregistration

https://www.menti.com/al27md43gqzn

Science in Crisis?



https://www.scottdmiller.com/the-replication-crisis-in-psychology-what-is-and-is-not-being-talked-about/ Baker (2016): 1,500 scientists lift the lid on reproducibility

REPLICATION

Why do we have a crisis?

Publish or Perish

Giphy.com

Poor practices

- Publication bias
- Confirmation bias
- Outright fraught
- **HARKing**
- **Under-reporting**
- **Selective reporting**
- **P-hacking**

HARKing

= Hypothesizing after results are known

"I knew it all along!"

https://nesslabs.com/hindsight-bias

Selective reporting & under-reporting

Reporting only a **subset** of hypotheses tested

→Increase in **false positives**

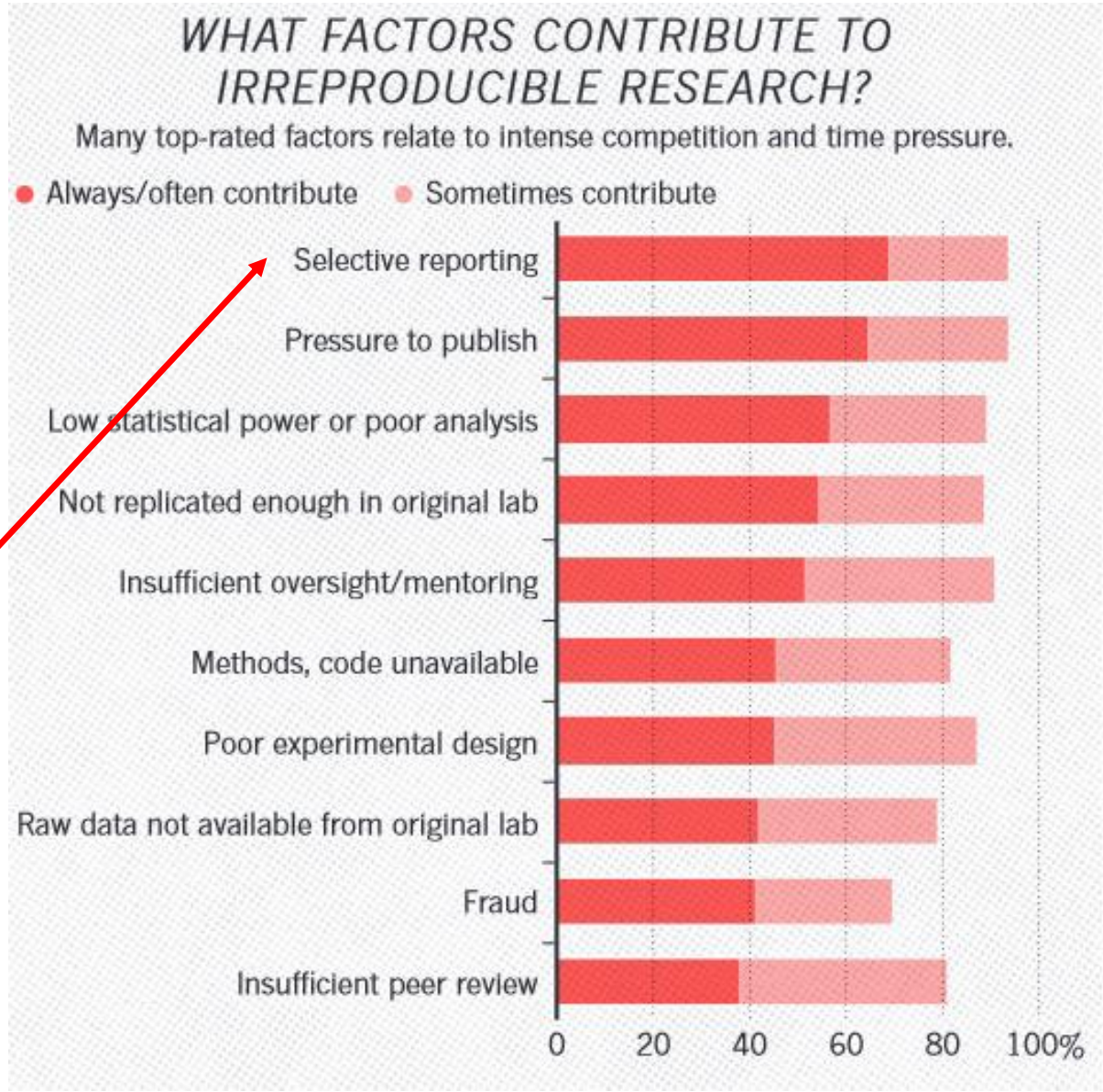
Credit: Aaron Watson Photography

Selective reporting & under-reporting

Reporting only a **subset** of hypotheses tested

→Increase in **false positives**

e.g., leaving out conditions, variables, analyses that did not « work », omitting null results



Baker (2016)

P-Hacking

A variety of practices that **increase the odds of finding a statistically significant results** by, for instance, conducting multiple versions of an analysis with different covariates or subsets of the data

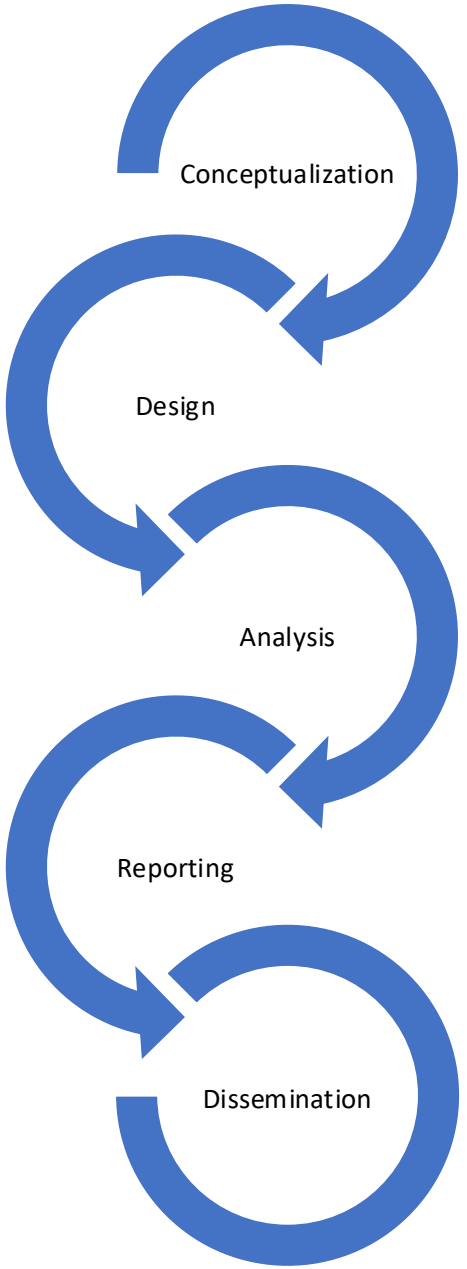
→Increase in **irreproducible results**

Taken from: https://osf.io/egf7w/files/tw4n3

Behaviors to implement

See article by Kathawalla et al. (2021)

Open Science Practices



- Project Workflow
- Journal Clubs

- **Preregistration**
- **Registered Reports**
- Data sharing planning

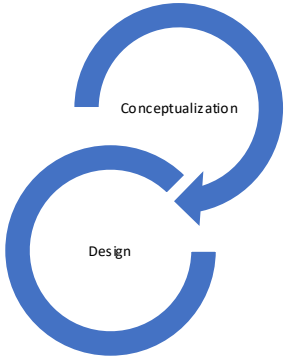
- Reproducible Code

- Transparent Writing

- Preprints
- Open Data, Materials & Code

Kathawalla et al. (2021)

Design
Preregistration



<u>Confirmatory vs. exploratory research</u>

- Verifying a hypothesis vs. looking for a hypothesis
- Hypothesis-testing vs. hypothesis generation
- Both are valid and important BUT

1) One should not be presented as the other
2) The same data cannot be used to generate *and* test a hypothesis, which can happen unintentionally and reduce the credibility of your results

Taken from https://osf.io/g45nt/

Preregistration

The practice of publishing the plan for a study, including research questions/hypotheses, research design, data and analysis ***before the data has been collected or examined.***

Parsons, S., Azevedo, F., Elsherif, M. M., Guay, S., Shahim, O. N., Govaart, G. H., ... & Aczel, B. (2022). A community sourced glossary of open scholarship terms. Nature human behaviour, 6(3), 312-318.

Taken from https://osf.io/g45nt/

Preregistration

Principle: A timestamped, non-modifiable, online document presenting the research, its methods and goals

When: Before collecting/accessing/inspecting/analyzing research data

Content: Hypothesis, methods, participants (including sample size, inclusion or exclusion criteria), analysis, main outcome

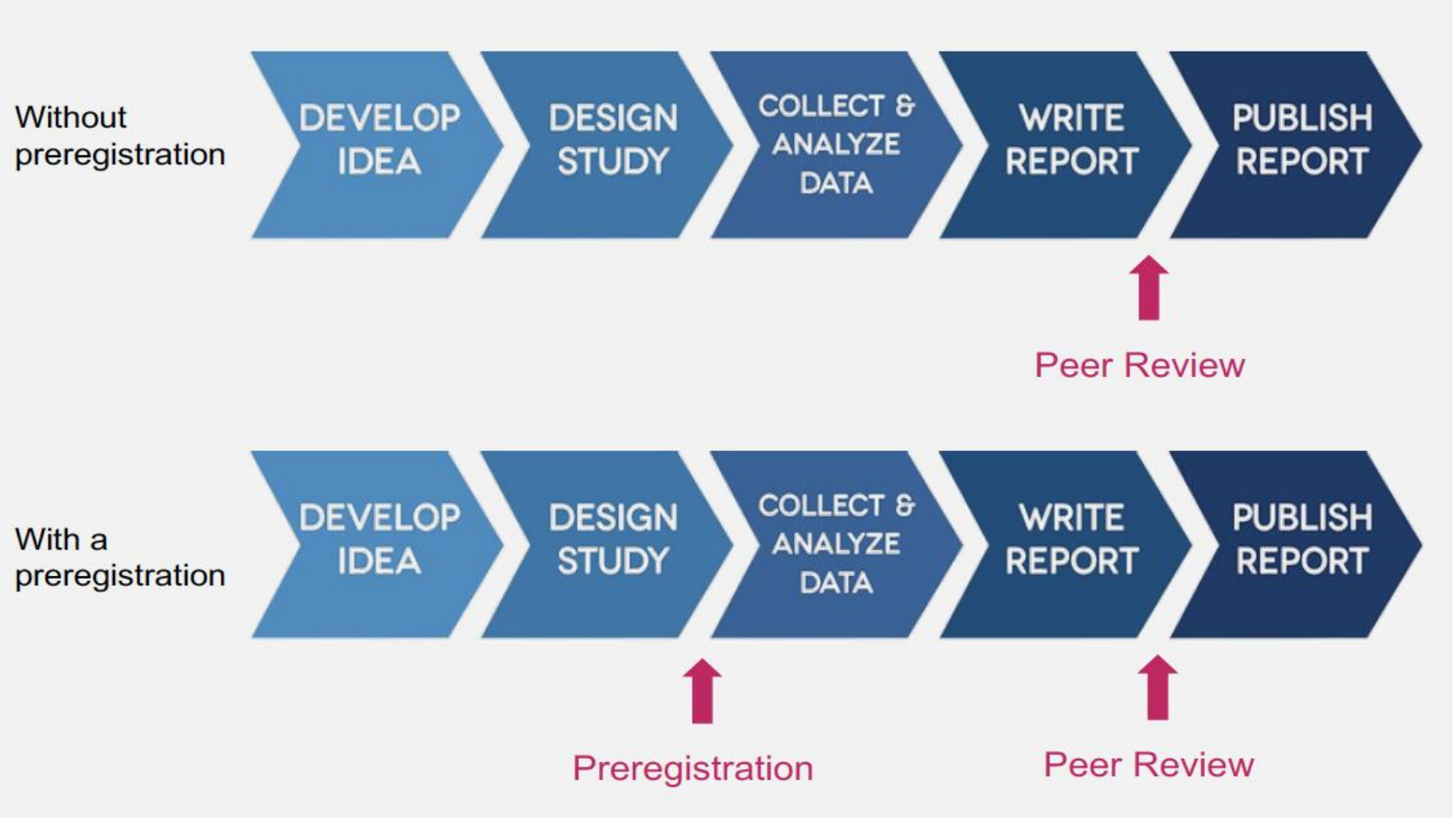
Sharing: Generally on a dedicated server, allowing for a unique and permanent identifier

Taken from https://osf.io/g45nt/

Preregistration in the **Research Workflow**

Taken from https://osf.io/g45nt/

Preregistration in the **Research Workflow**

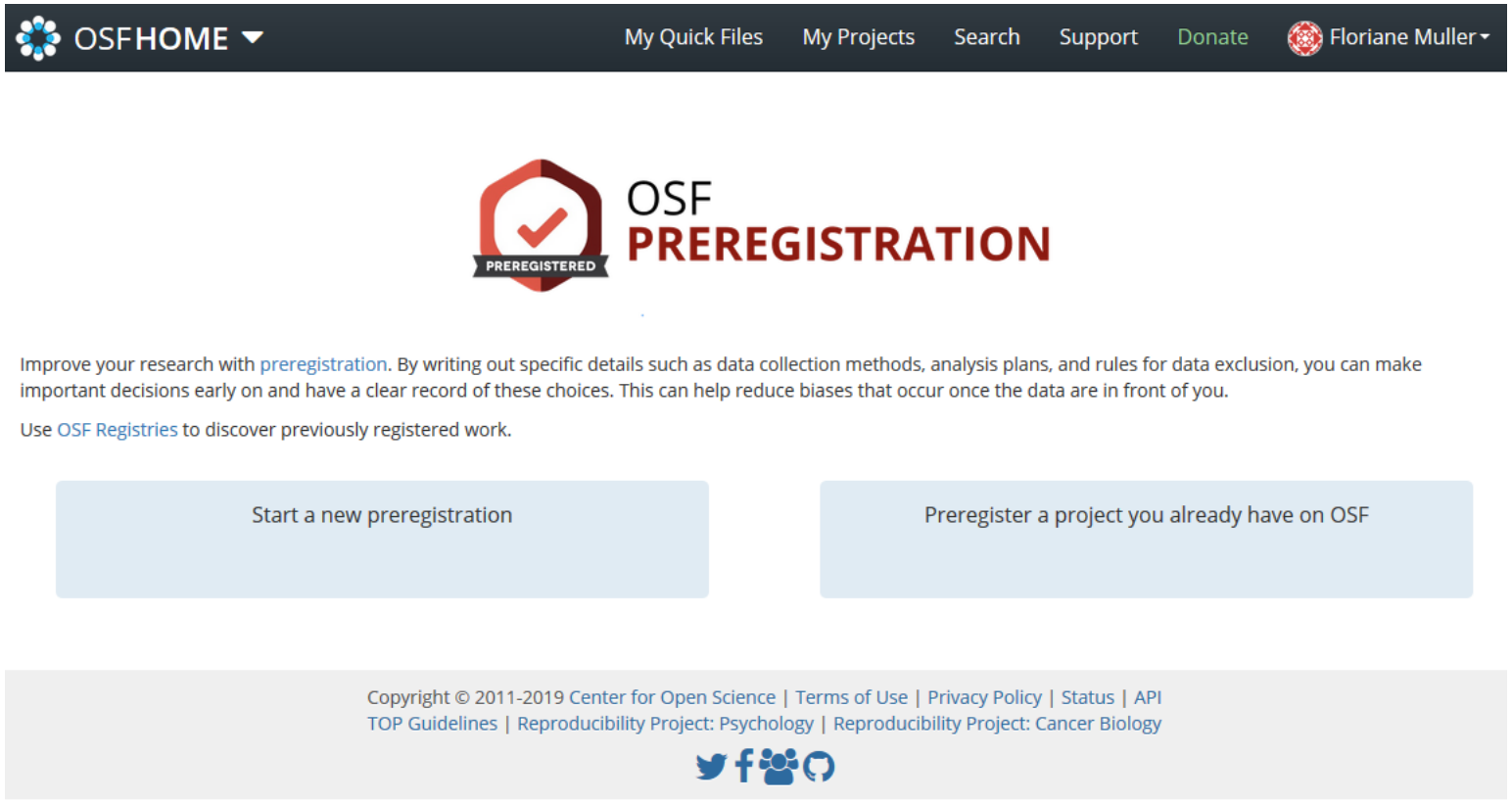


Taken from https://osf.io/g45nt/

Tools & Implementation

Taken from https://osf.io/g45nt/

Creating a Preregistration with OSF



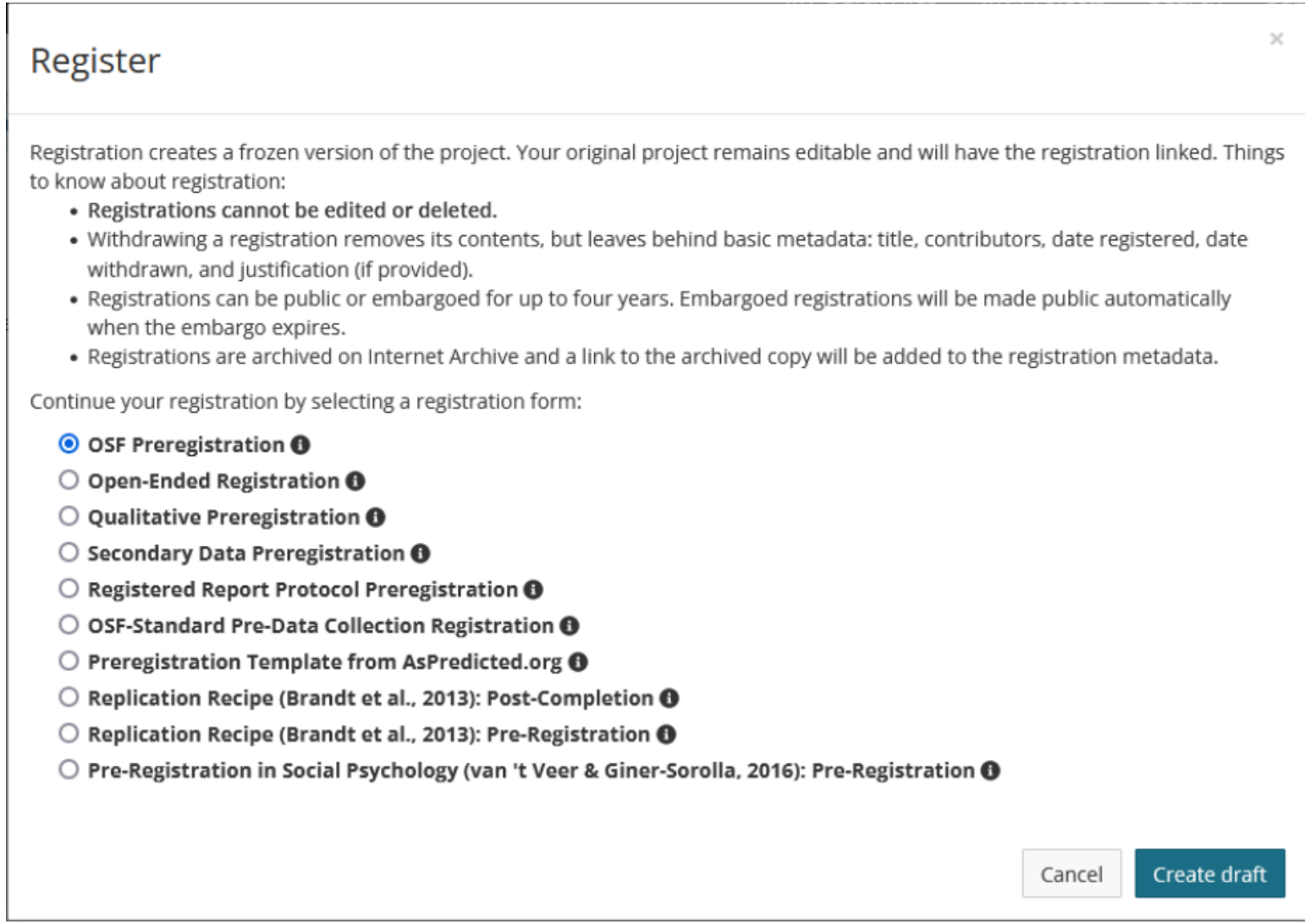
Taken from https://osf.io/g45nt/

Creating a Preregistration with OSF or AsPredicted

- ***Time stamped*** preregistration
- Possible to preregister ***before data collection***, ***before first inspection of data***, ***before data analysis***
- Possible to ***embargo*** registration: not public immediately

Taken from https://osf.io/g45nt/

OSF Templates

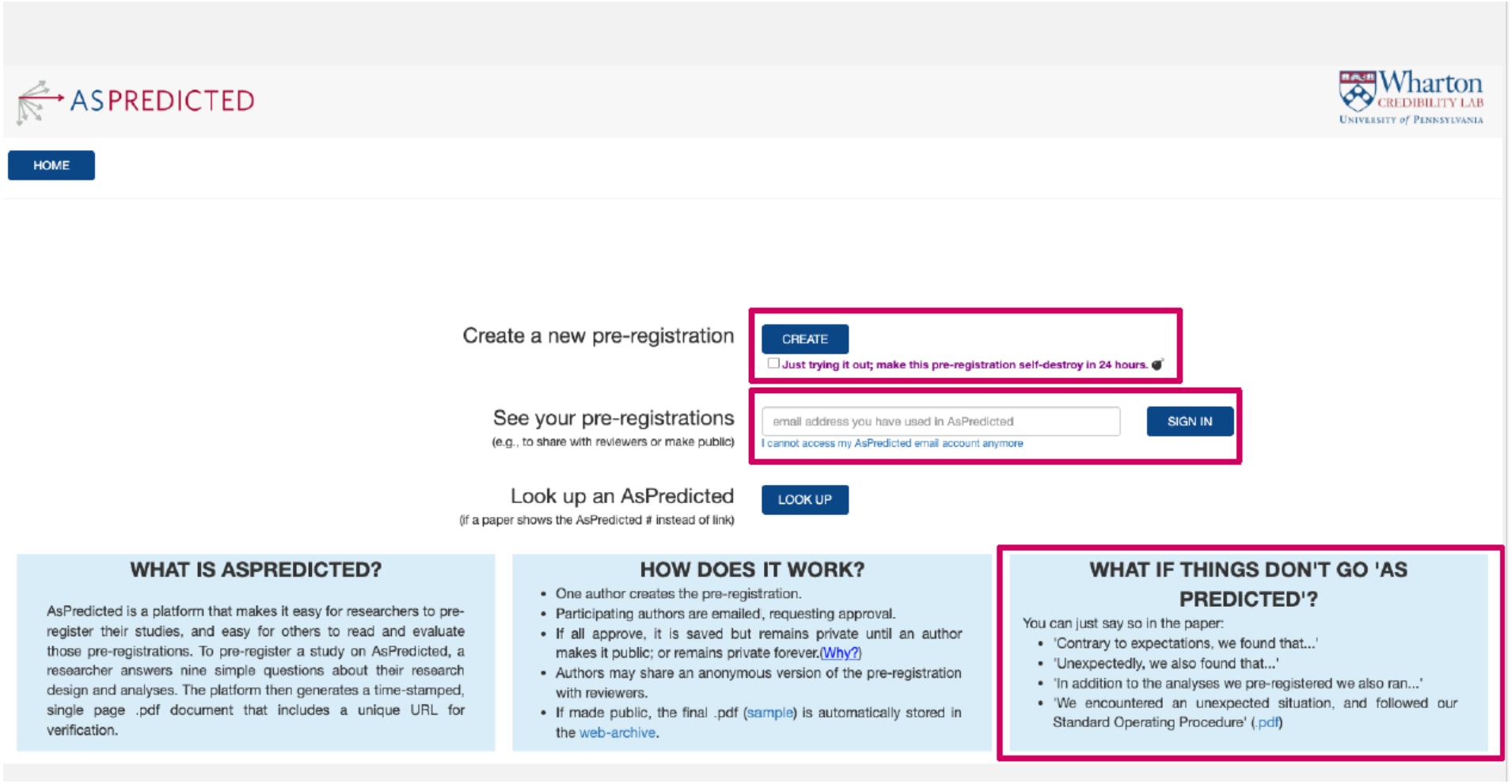


Taken from https://osf.io/g45nt/

OSF Example

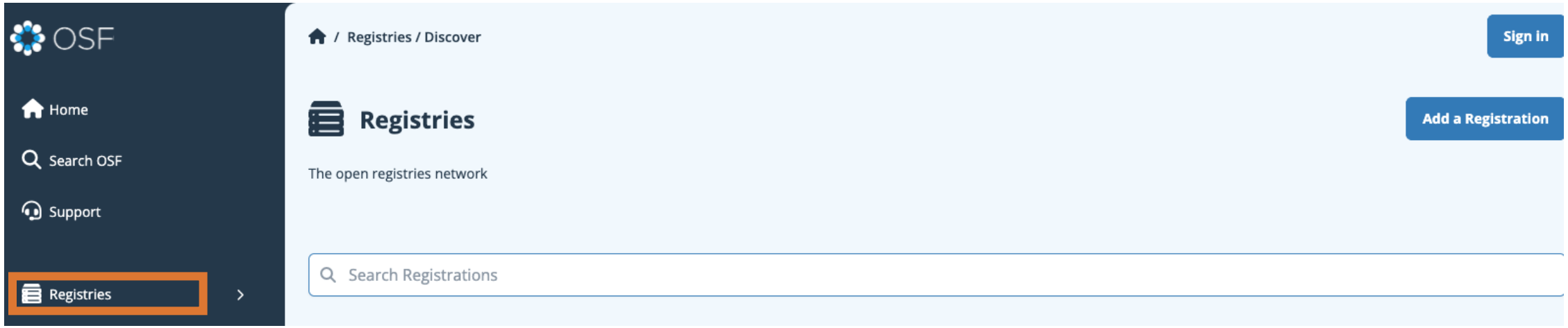
https://osf.io/wekmb/overview

AsPredicted



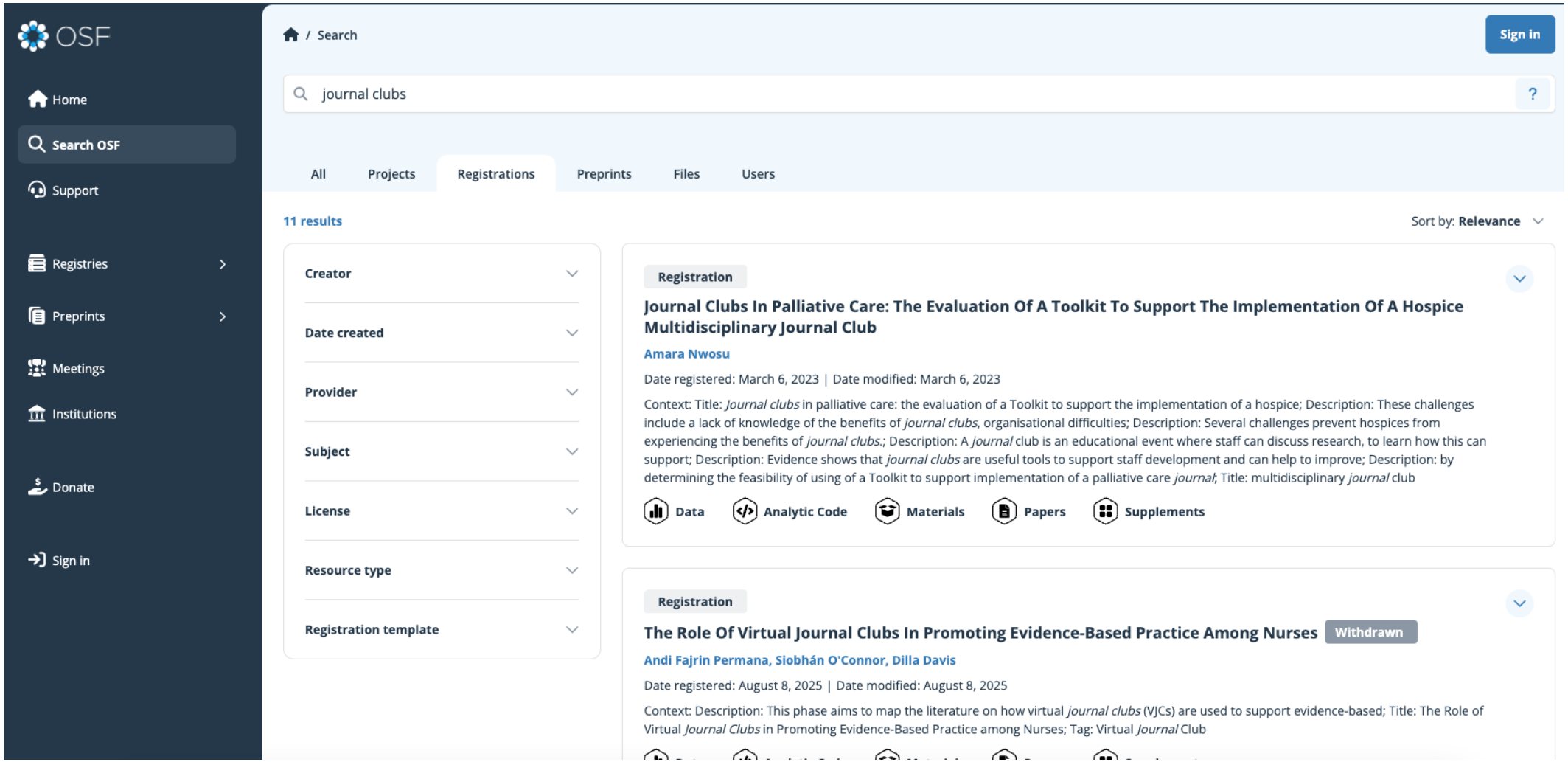
Taken from https://osf.io/g45nt/

Looking for preregistrations



→ Search engine for preregistrations across registration platforms
→ https://osf.io/registries

Looking for preregistrations



Some examples…

Taken from https://osf.io/g45nt/

Vignette A

Sean and Maia are two post-docs working on a project together. They preregistered the design, analysis, and exclusion criteria before executing the study.

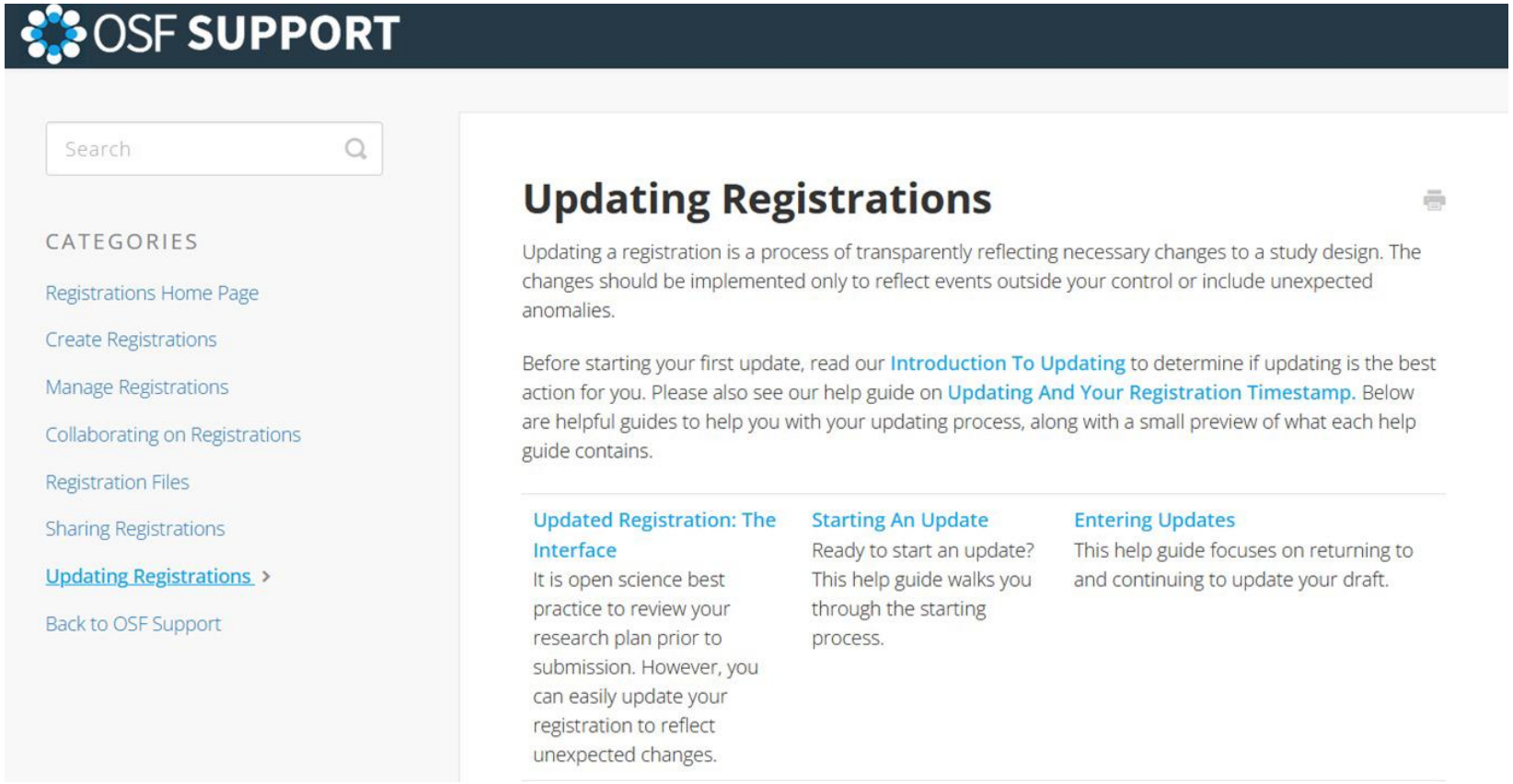
All the data are now collected, and Sean and Maia want to run the planned analysis. In doing so, Sean notices that their planned analysis didn't take into account the possibility that some participants would have extremely long response times. Sean tells Maia that they forgot this in the preregistration and that, even though they would typically exclude these responses, they now have to perform the analysis including these long response times since that is what they preregistered. Maia, however, does not agree with Sean and says that they can deviate from the preregistration. Do you agree with Sean or Maia? Why? And what should they do?

Taken from https://osf.io/g45nt/

Vignette A

Preregistration is NOT a prison

One can deviate, as long as this is clearly explained in the manuscript



Taken from https://osf.io/g45nt/

Deviations

Willroth EC, Atherton OE. Best Laid Plans: A Guide to Reporting Preregistration Deviations. *Advances in Methods and Practices in Psychological Science*. 2024;7(1). doi:10.1177/25152459231213802

Template: https://docs.google.com/document/d/1m7k53z38w18AJe56ucftunnHuFM7wDlMFjpoGenwN6k/edit?tab=t.0

Table S1

Preregistration Deviations Table Template

Deviations

#	Details		Original Wording	Deviation Description	Reader Impact
1	Type	Select One	*Provide the wording from the original preregistration, or a description of what the original preregistration plan was.*	*Provide a narrative description and justification for the deviation.*	*Provide a narrative description of whether and how the deviation should affect the readers' interpretation of the study and/or results.*
	Reason	Select One			
	Timing	Select One			
2	Type	Select One			
	Reason	Select One			
	Timing	Select One			
3	Type	Select One			
	Reason	Select One			
	Timing	Select One			

Unregistered Steps

#	Details		Original Wording	Unregistered Step Description	Reader Impact
1	Type	Select One	*If applicable, provide the wording from the original preregistration that was unregistered or not specific enough. If the issue was not addressed in the preregistration at all, please note that here as well.*	*Provide a narrative description of how the unregistered step was handled, and a justification for that approach.*	*Provide a narrative description of whether and how the unregistered step should affect the readers' interpretation of the study and/or results.*
	Timing	Select One			

Taken from https://osf.io/g45nt/

Vignette B

Tina, a second year PhD student, is following up on an existing study from a famous professor. The professor knows about her research because she presented a first study of this project at a conference where they both were. At this conference, it already became clear that the professor was not too happy about Tina's research as the results contradicted his original findings. At some point, the professor reached out to Tina to ask about her progress. Tina gave the professor an update but remained vague about her future plans. Until now, Tina has always preregistered her studies but after the email, she got scared of being scooped.

She talks to her supervisor about the situation. Her supervisor says she should not preregister as the risk of being scooped is way too high. Tina still thinks it would be better to preregister the study.

Do you agree with Tina or her supervisor? Why?

Taken from https://osf.io/g45nt/

Vignette B

Preregistration can associate your name to the experiment, with a time stamp → guarantees maternity/paternity

Also, preregistrations can be embargoed on some platforms (with an anonymous view-only link for the reviewers)

An embargo keeps a registration private until a specified date.

Taken from https://osf.io/g45nt/

Worries vs. experiences

Table 2. Comparison of worries and actual problems regarding preregistration.

"What worries do you have with respect to preregistering your studies?"	Percentage (Frequency) $N = 94$	"Did you encounter specific problems when preregistering a study? If yes, which ones?"	Percentage (Frequency) $N = 190$
High time costs	61.7 (58)	It took very long to do the preregistration	45.26 (86)
Low flexibility	54.26 (51)	I found it problematic to not have flexibility during my analyses	15.26 (29)
Maybe the study design would need to be changed because details do not work, but this would not be possible	46.81 (44)	Study design would have needed to be changed because details did not work, but this was not possible	13.68 (26)
If deviations were necessary, my study would lose credibility	44.68 (42)	Deviations were necessary and my study lost credibility	17.37 (33)
Scooping (i.e., someone taking my idea and publishing it before me)	37.23 (35)	I got scooped (i.e., someone took my idea and published it before me)	4.74 (9)
I would be insecure about what needs to be included in the preregistration	29.79 (28)	I was insecure about what needs to be included in the preregistration	41.05 (78)
Errors in the preregistration cannot be changed afterwards	26.6 (25)	Errors in the preregistration could not be changed afterwards	25.26 (48)
My supervisor/co-author(s) would object	14.89 (14)	Conflict with supervisor/co-author	9.47 (18)
Other	5.32 (5)	Other	12.11 (23)
None	3.19 (3)	None	13.68 (26)

"Worries" item was shown to participants without preregistration experience, and "problems" item was shown to participants with preregistration experience. Multiple options could be selected.

Spitzer, L., & Mueller, S. (2023). Registered report: Survey on attitudes and experiences regarding preregistration in psychological research. *PLOS ONE*, *18*(3), e0281086. https://doi.org/10.1371/journal.pone.0281086

Taken from https://osf.io/g45nt/

So, why preregister?

For Science:

- Prevent selective reporting
- Prevent p-hacking
- Prevent hindsight bias
- Explicit distinction between confirmatory and exploratory research

→ ***Increase reproducibility and replicability***

For yourself:

- Allows you to take credit for your predictions
- Your research results are more trustworthy
- You increase the credibility of your publications

Taken from https://osf.io/g45nt/

So, all good and easy?

Marie is reading an article that is very relevant for an ongoing study she is doing with Bert. She shows him the article and Bert reads through it. After reading it, Bert says that the effect doesn't seem very convincing in the figures and the descriptive results.

Marie is surprised by his reaction and responds that the results surely must be robust and reliable because the authors preregistered the study before executing it. In turn, Bert says that preregistering a study does not guarantee its robustness or reliability.

Do you agree with Marie or Bert? Why?

Taken from https://osf.io/g45nt/

So, all good and easy?

- Preregistration is not sufficient for robust and reliable research
- Preregistration does not mean good science
- If the preregistered design and/or analyses are of poor quality, their preregistered status won't save them
- Preregistration does not solve all issues
- Also, preregistration is not necessary for robust and reliable research (even though preliminary evidence that preregistration reduces the proportion of 'positive' results; ~66% compared to 96% in standard papers; Akker, 2021)

Taken from https://osf.io/g45nt/

So, all good and easy?

Preregistration Is Hard, And Worthwhile

Brian A. Nosek,[1,*]
Emorie D. Beck,[2]
Lorne Campbell,[3]
Jessica K. Flake,[4]
Tom E. Hardwicke,[5]
David T. Mellor,[1]
Anna E. van 't Veer,[6] and
Simine Vazire[7]

Letter

Is Preregistration Worthwhile?

Aba Szollosi,[1,*]
David Kellen,[2]
Danielle J. Navarro,[1]
Richard Shiffrin,[3] Iris van Rooij,[4]
Trisha Van Zandt,[5] and
Chris Donkin[1]

The benefits of preregistration and Registered Reports

Daniël Lakens, Cristian Mesquida, Sajedeh Rasti & Massimiliano Ditroilo

Perspective | Published: 26 January 2023

Reducing bias, increasing transparency and calibrating confidence with preregistration

Tom E. Hardwicke & Eric-Jan Wagenmakers

Research Dialogue | Full Access

Preregistration Is Neither Sufficient nor Necessary for Good Science

Michel Tuan Pham, Travis Tae Oh

Well…

To be considered, as well

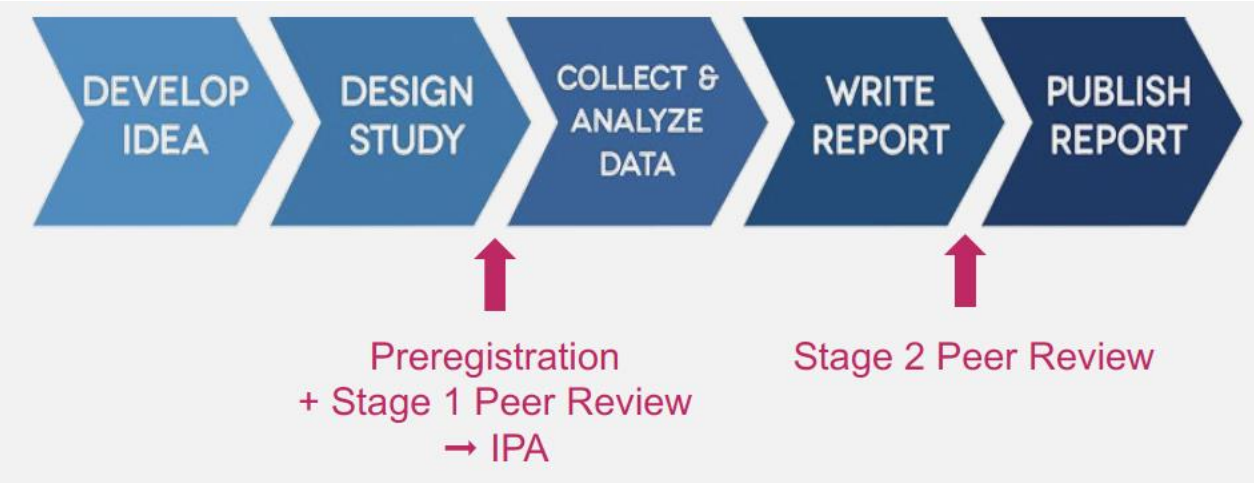
- Percentage of agreement on the number of hypotheses in a preregistration around 14 % (Bakker et al., 2020)
- Preregistrations often very vague und underspecified (Bakker et al., 2020; Claesen et al., 2021)
- Many reviewers do not read the preregistration
- No real “rules” on how to do a good preregistration
- Risk of people “preregistering to preregister”

Taken from slides Malte Elson, Reproducibility Day Geneva 2025

How to prevent deviations?

Registered Reports

- Study proposal is reviewed before research is undertaken
- **In-principle-acceptance (IPA)**: acceptance before results are known, independent of results → reduces publication bias
- Explicit check of reported analyses vs. preregistration during peer review 2



Taken from https://osf.io/g45nt/

Theoretical Benefits	Registered Reports	Preregistration	Standard article
For the research community:			
- Reduces researcher bias: p-hacking & HARKing	✓	✓	✗
- Eliminates reporting bias: publication bias & outcome bias	✓	✗	✗
- Incentivises novel, resource-intensive projects (where publication would normally be contingent on results)	✓	✗	✗
- Encourages formulation of precise research question and plans a priori	✓	✓	✗
For researchers:			
- Peer review when it's most helpful	✓	✗	✗
- Guaranteed publication	✓	✗	✗
- IPA on your CV	✓	✗	✗
- Reduces stress (publication is not contingent on novel results, significant results, or supported hypotheses)	✓	✗	✗

Henderson (2022) https://osf.io/preprints/metaarxiv/x7aqr

Taken from https://osf.io/g45nt/

Registered Reports

- Scheel et al. (2021): compared 152 standard reports with 71 RRs
- Standard reports: 95% found support for their hypothesis
- RRs: only 45%

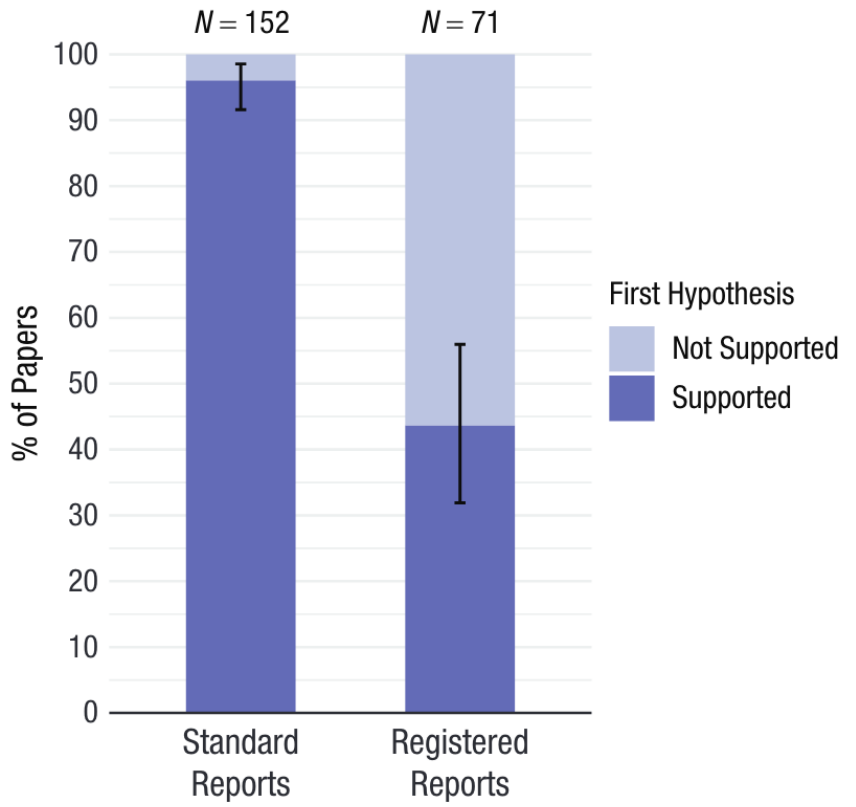


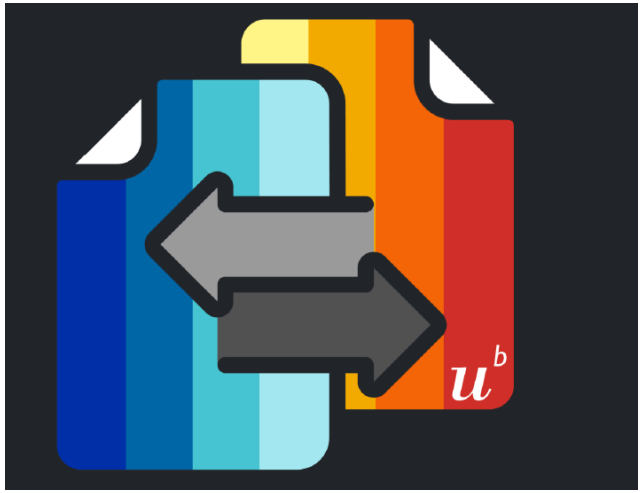
Fig. 2. Positive result rates for standard reports and Registered Reports. Error bars indicate 95% confidence intervals around the observed positive result rate.

Taken from https://osf.io/g45nt/

Registered Reports

- Different approach: Prepare everything before data collection
- But: Takes time before acceptance → important to plan for this

Regcheck App



- Automatically compares preregistration and full paper for coherence
- Reports matches and deviations in a Deviations Table
- Directs reviewer to relevant page numbers

https://regcheck.app/

Taken from slides Malte Elson, Reproducibility Day UNIGE 2025

Do I *really* need to preregister?

Do I *really* need to preregister?

- ***Preregistration CAN be a great way to improve your scientific practice:***
  - For science: reduce HARKing, selective reporting, clearer distinction between explorative and confirmatory research
  - For yourself: Planning ahead may facilitate the research process later, you can timestamp your idea
- BUT: Preregistration should not be just a sticker on your paper → needs to be done with care and the right intensions!
- This does not mean you cannot deviate → you just need to be clear and transparent about it!
- Registered Reports as a more bulletproof, but also more time-consuming option

Interested? Come to our Journal Club

- Open to all researchers –> no knowledge needed!
- We meet 3x per semester
- Paper discussions, Boardgames, Talks by colleagues, fun!

RN CH Swiss Reproducibility Network

References

Baker, M. 1,500 scientists lift the lid on reproducibility. *Nature* 533, 452–454 (2016). https://doi.org/10.1038/533452a

Crüwell, S., van Doorn, J., Etz, A., Makel, M. C., Moshontz, H., Niebaum, J. C., ... & Schulte-Mecklenbeck, M. (2019). *Seven easy steps to open science.* Zeitschrift für Psychologie.

Henderson, E. L. (2022). A guide to preregistration and registered reports. *Preprint. https://osf. io/preprints/metaarxiv/x7aqr/download*.

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.

Parsons, S., Azevedo, F., Elsherif, M.M. *et al.* A community-sourced glossary of open scholarship terms. *Nat Hum Behav* 6, 312–318 (2022). https://doi.org/10.1038/s41562-021-01269-4

Scheel, A. M., Schijen, M. R., & Lakens, D. (2021). An excess of positive results: Comparing the standard psychology literature with registered reports. Advances in Methods and *Practices in Psychological Science, 4*(2), 251524592110074 67.

Smaldino, P. E., & McElreath, R. (2016). The natural selection of bad science. *Royal*

Society open science, 3(9), 160384.

Spitzer, L., & Mueller, S. (2023). Registered report: Survey on attitudes and experiences regarding preregistration in psychological research. *Plos one*, *18*(3), e0281086.