Preregistration and Registered Reports: What, Why, and How

Michaelmas Term, 20 Nov 2024 – 14:00-15:30

Everyone please take the poll:
menti.com
Code: **3207 6157**

This session will be recorded

Slides and handouts will be distributed after the session

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BODLEIAN LIBRARIES

Workshop plan

- What
  - Preregistration
  - Registered Reports
- Why
  - Background of scientific justification
  - Selfish reasons
  - Evidence
- FAQ
- How
  - Deciding whether prereg/RR is right for your project
  - Fundamentals of a good preregistration
    - Practical exercise
  - Where to register
  - What format
  - Personal examples
- Practical
  - Follow along example on OSF
  - Q&A

Learning Objectives

Describe what preregistration and Registered Reports are (and how they differ)

Explain the benefits (and drawbacks) of preregistration and Registered Reports

Identify what types of research are most suited for preregistration and Registered Reports

Recognise the common pitfalls in writing a preregistration

Identify the logistics of preregistering: which format and platform to use

Poll: familiarity

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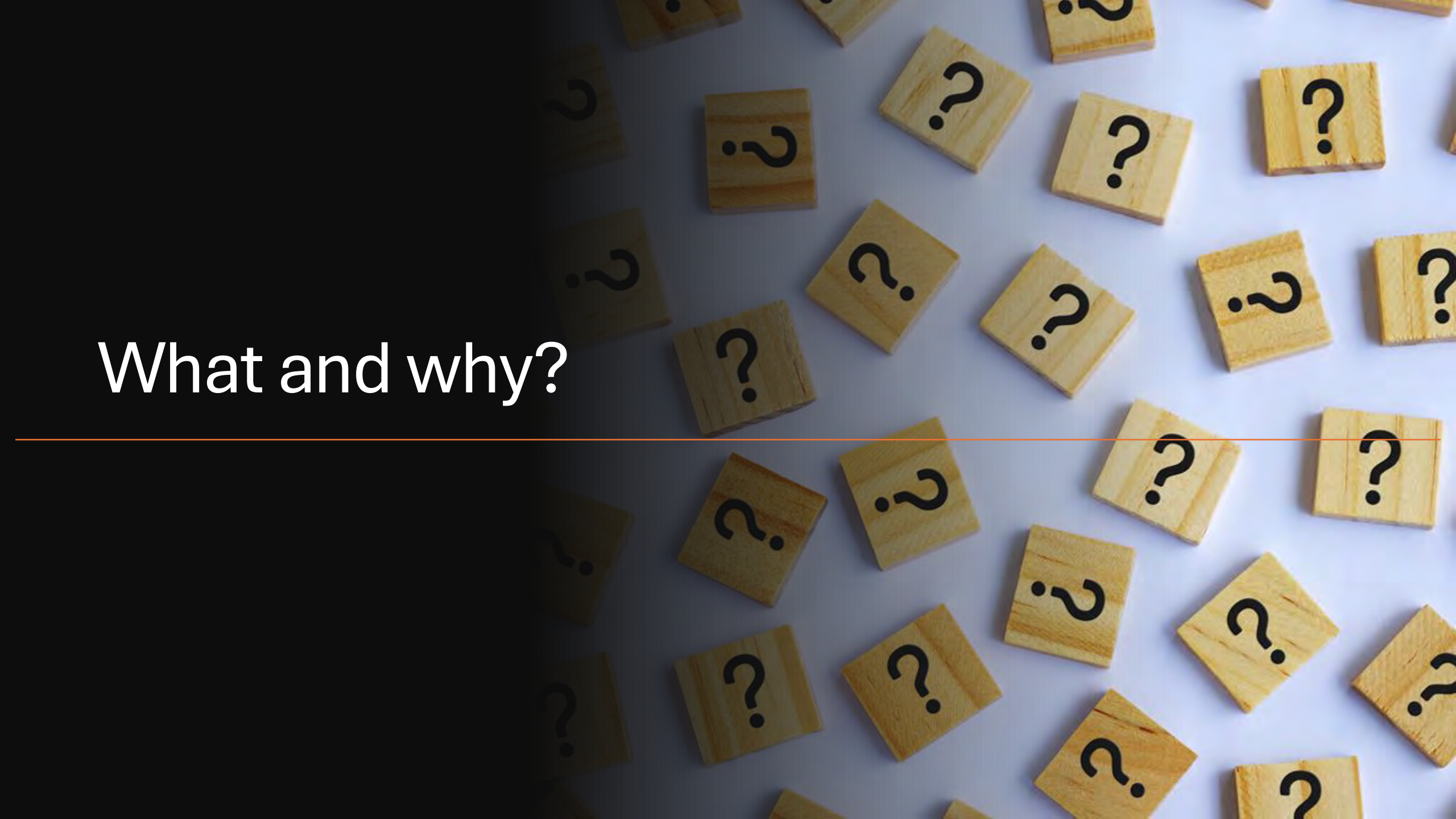
What and why?



What is preregistration?

A preregistration documents:

- That the study exists
- The protocol:
  - research questions/hypotheses
  - how data will be gathered
  - data analysis and interpretation plans

Document goes into a registry **before** the study is run, where it is **time stamped** and *eventually* **available for readers**.

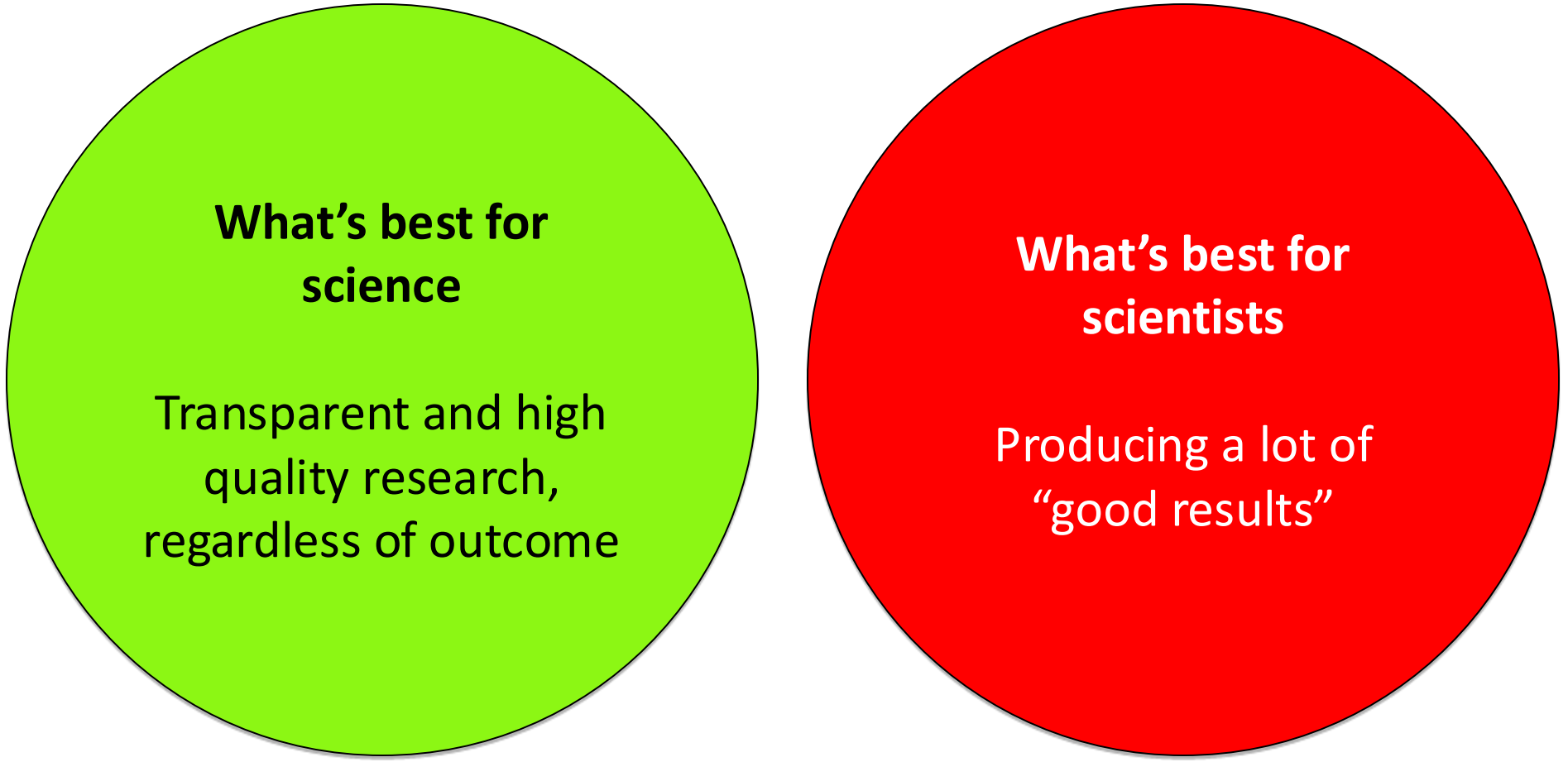
What kinds of research can be preregistered?

Almost any type!
Researchers have successfully used preregistration for:

- Experiments
- Randomized clinical trials*
- Descriptive studies (A COVID-19 descriptive study of life after lockdown in Wuhan, China)
- Qualitative studies (Phenomenological strands for gaming disorder and esports play: A qualitative registered report)
- Systematic reviews (An umbrella review on the use of antipsychotics in anxiety disorders: A registered report protocol)
- Others

Slide courtesy Fiona Fidler

Science has an incentive problem



see Nosek, Spies & Motyl (2012). *Perspectives on Psychological Science, 7(6)*: 615–631
Slide courtesy Chris Chambers

Slide courtesy Chris Chambers

Four key factors leading to poor reproducibility

Publication bias

Low power

P-hacking

HARKing

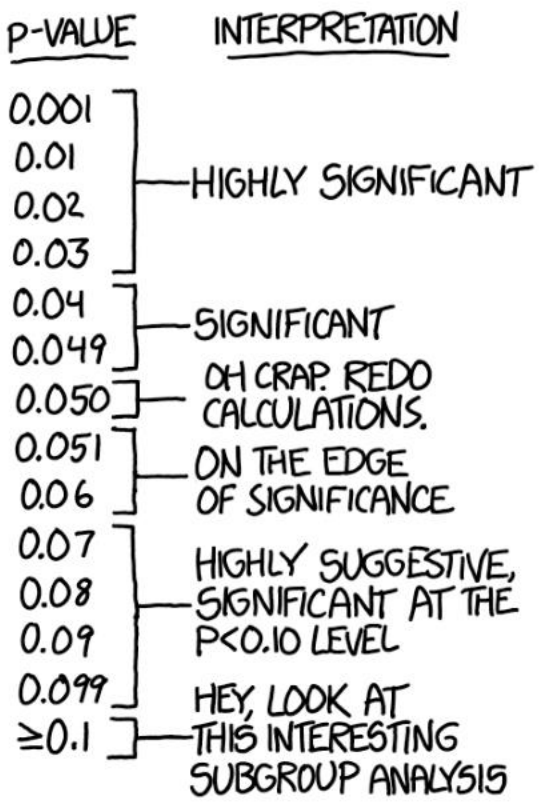
Slide courtesy
Dorothy Bishop

Publication bias

The 'file drawer' problem:

Researchers won't publish (or reviewers won't accept) studies with unattractive (e.g., null) results

P-hacking creates huge risk of false positives



From: xkcd.com/1478/

Multiple ways to p-hack:

- Continue/stop data collection
- Covariates
- Exclusions (ppts, vars)
- Multiple comparisons
- And much more

Personality and Social Psychology Review
1998, Vol. 2, No. 3, 196–217

HARKing: Hypothesizing After the Results are Known

Norbert L. Kerr
Department of Psychology
Michigan State University

HARKING seems innocuous but it fills the literature with dross

Psychological SCIENCE
A Journal of the Association for Psychological Science

False-Positive Psychology

Undisclosed Flexibility in Data Collection and Analysis Allows Presenting Anything as Significant

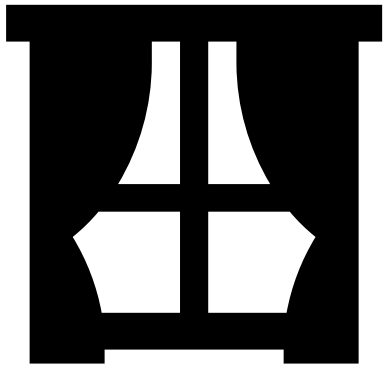
Joseph P. Simmons[1], Leif D. Nelson[2] and Uri Simonsohn[1]

Table 3. Study 2: Original Report (in Bolded Text) and the Requirement-Compliant Report (With Addition of Gray Text)

Using the same method as in Study 1, we asked ~~20~~ 34 **University of Pennsylvania undergraduates to listen** only **to either "When I'm Sixty-Four" by The Beatles or "Kalimba"** or "Hot Potato" by the Wiggles. We conducted our analyses after every session of approximately 10 participants; we did not decide in advance when to terminate data collection. **Then, in an ostensibly unrelated task, they indicated** only **their birth date (mm/dd/yyyy) and** how old they felt, how much they would enjoy eating at a diner, the square root of 100, their agreement with "computers are complicated machines," **their father's age**, their mother's age, whether they would take advantage of an early-bird special, their political orientation, which of four Canadian quarterbacks they believed won an award, how often they refer to the past as "the good old days," and their gender. **We used father's age to control for variation in baseline age across participants.**

An ANCOVA revealed the predicted effect: According to their birth dates, people were nearly a year-and-a-half younger after listening to "When I'm Sixty-Four" (adjusted *M* = 20.1 years) rather than to "Kalimba" (adjusted *M* = 21.5 years), *F*(1, 17) = 4.92, *p* = .040. Without controlling for father's age, the age difference was smaller and did not reach significance (*M*s = 20.3 and 21.2, respectively), *F*(1, 18) = 1.01, *p* = .33.

Preregistration solves these problems



Establishes transparency

This conveys credibility

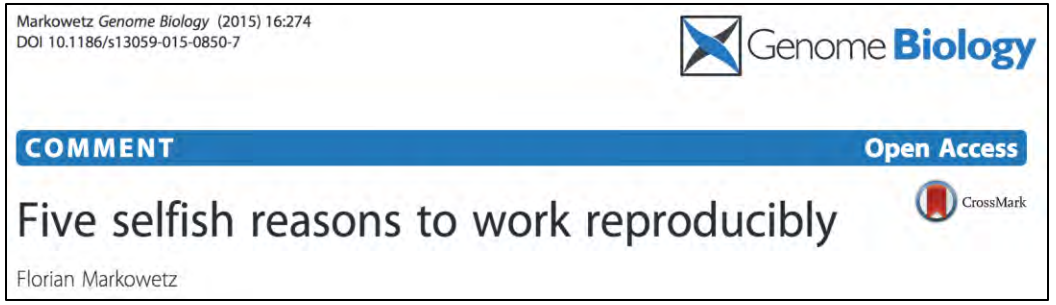
Selfish benefits

aps | ASSOCIATION FOR PSYCHOLOGICAL SCIENCE

Seven Selfish Reasons for Preregistration

ERIC-JAN WAGENMAKERS AND GILLES DUTILH

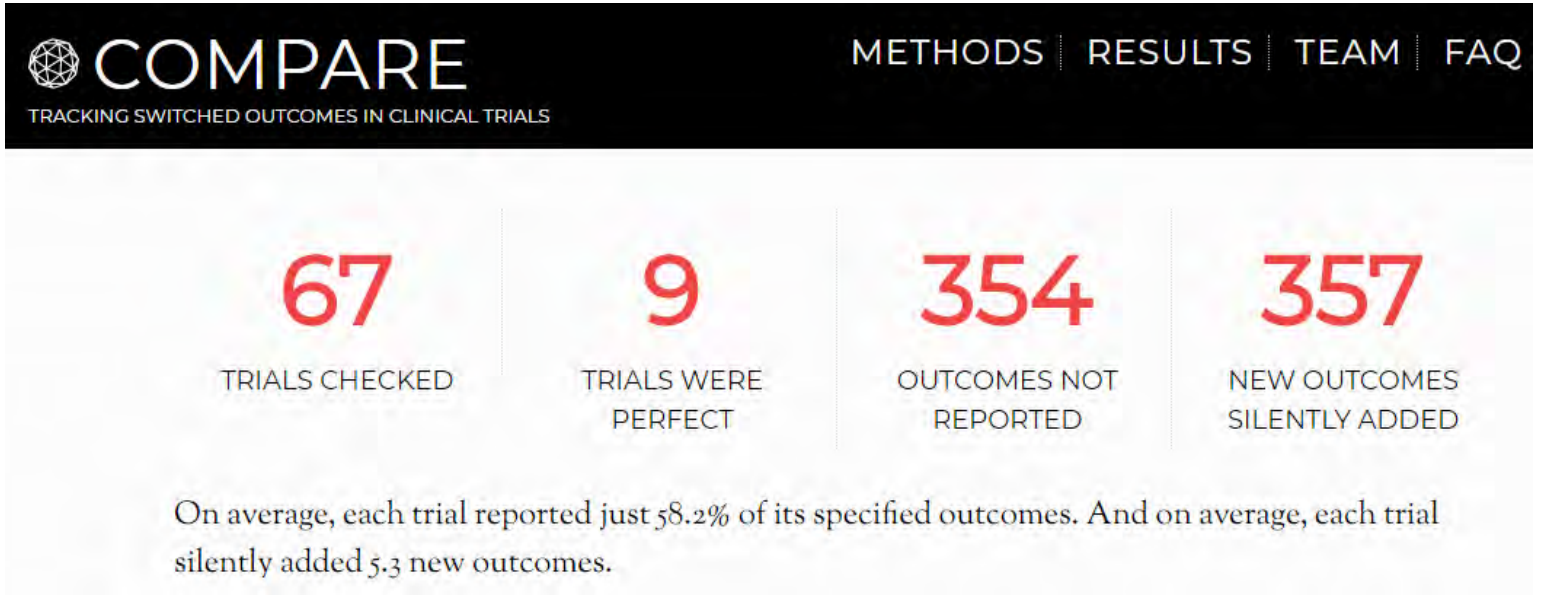
TAGS: DATA | EXPERIMENTAL PSYCHOLOGY | PREREGISTRATION | REGISTERED REPLICATION REPORTS | TECHNOLOGY



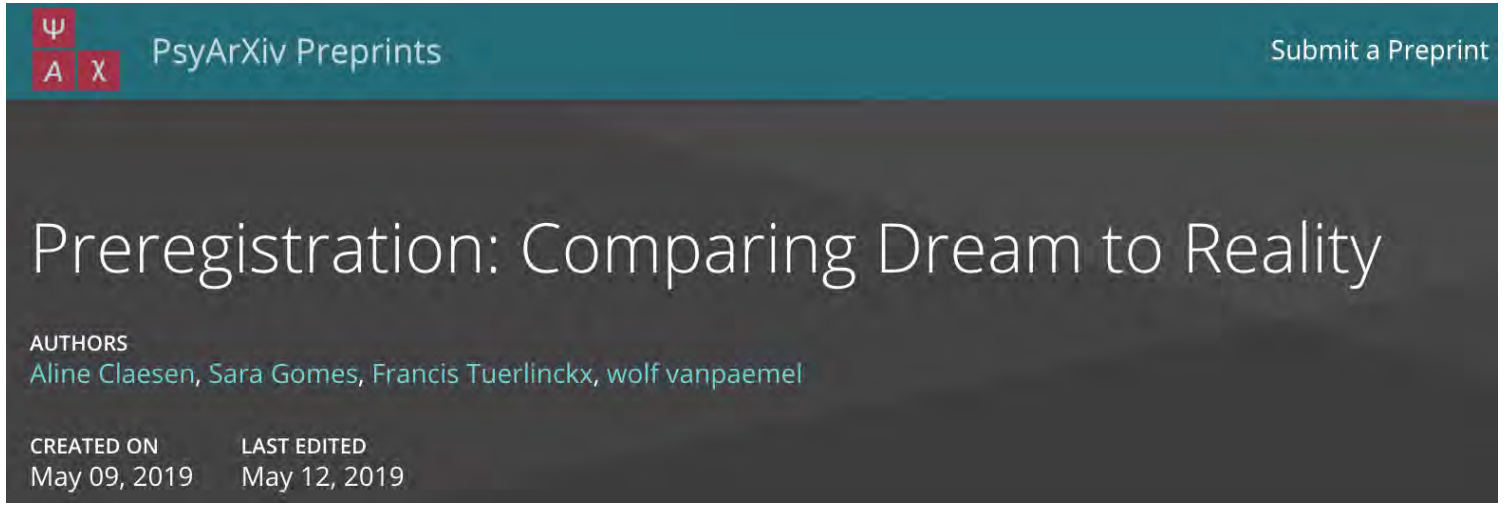
Preregistration...

- allows you to take credit for your predictions
- prevents you from being being fooled by your own data
- builds your reputation
- reassures reviewers
- associated with increased citations (van den Akker et al., 2023)
- makes your studies better (plan ahead!)
- aids continuity of your work (do it for Future You)

Limitations: Compliance



COMPare-trials.org



http://psyarxiv.com/d8wex/

Risks to Preregistration

Some fields are newer to these practices

Shifts in time spent at different steps of research process

Process of preregistration may change your study before it starts

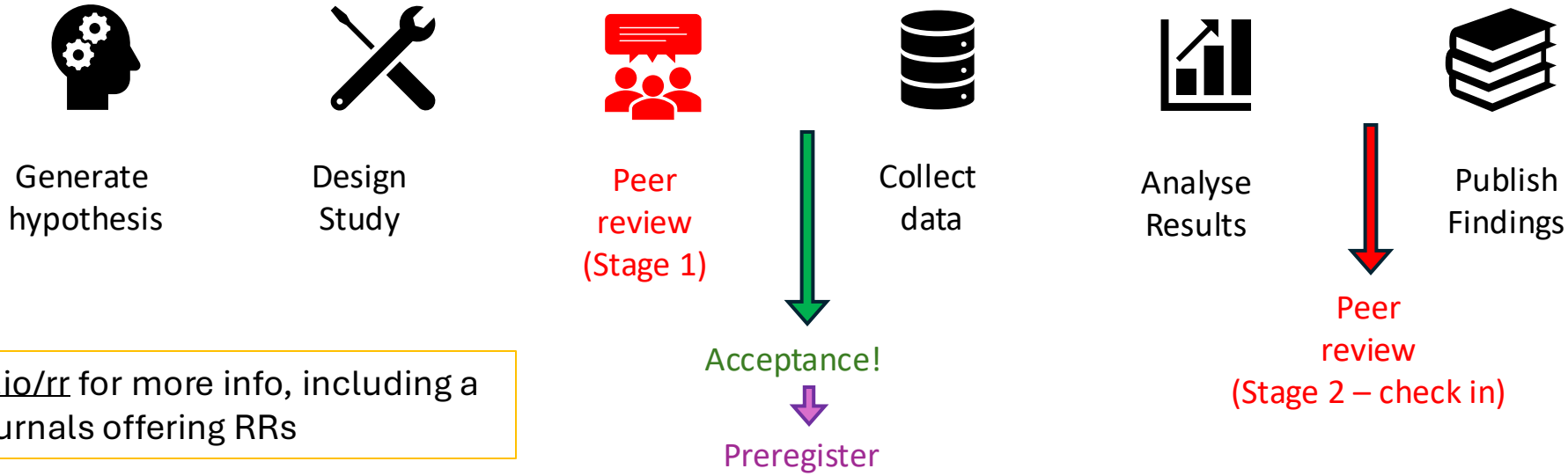
Preregistered ≠ GOOD! Prereg does not address some crucial problems:

- Linking theory to experiment
- Importance of research question
- Quality/appropriateness of study design

Upgrading preregistration: Registered Reports

Typical study

Registered Reports



See cos.io/rr for more info, including a list of journals offering RRs

Registered Reports, step by step

- **Stage 1 manuscript**:
  - Submit protocol: fully-written introduction, methods, analysis plan (no changes allowed after it is accepted)
  - Peer review and any rounds of revisions happen
- **In-principle acceptance** (IPA):
  - Journal gives the promise to publish the eventual results
  - The accepted Stage-1 manuscript is registered in a registry (either by journal or authors)
  - A minority of journals may publish the Stage-1 manuscript on its own, as a protocol (most wait and publish it later, with results)
- **Study is run**:
  - If any changes need to be made, authors run them by the editor
- **Stage 2 manuscript**:
  - Authors write up results and discussion, and submit the full manuscript to journal
  - Peer reviewers check that it followed the accepted protocol
  - Journal publishes the final, full article

Preregistration vs Registered Reports

	Preregistration	Registered Reports
Includes:		
Preregistration	✓	✓
Pre-study peer review		✓
‘Assured’ publication		✓
Solves issues of:		
P-hacking	✓	✓
HARKing	✓	✓
Publication bias		✓
Other attributes:		
Flexibility	Anytime before running	Wait for peer review/ acceptance
Publish in	Any journals	Limited journals (but growing)
Quality assurance	Moderate	Higher
Embargo of prereg	Fully possible	Usually possible, except for reviewers

Benefits to Registered Reports

Formal feedback comes at a more opportune time (can still get informal feedback on a preregistration)

Shifts evaluation of the study to decisions around methods and analysis (which you can control) rather than the results (which you can’t control)

Eliminates reviewer bias against negative or null findings

Eliminates researcher pressure to produce 'attractive' results

Acceptance rates are high, due to the points above

Reduces need/time for “journal hopping”

Limitations to Registered Reports

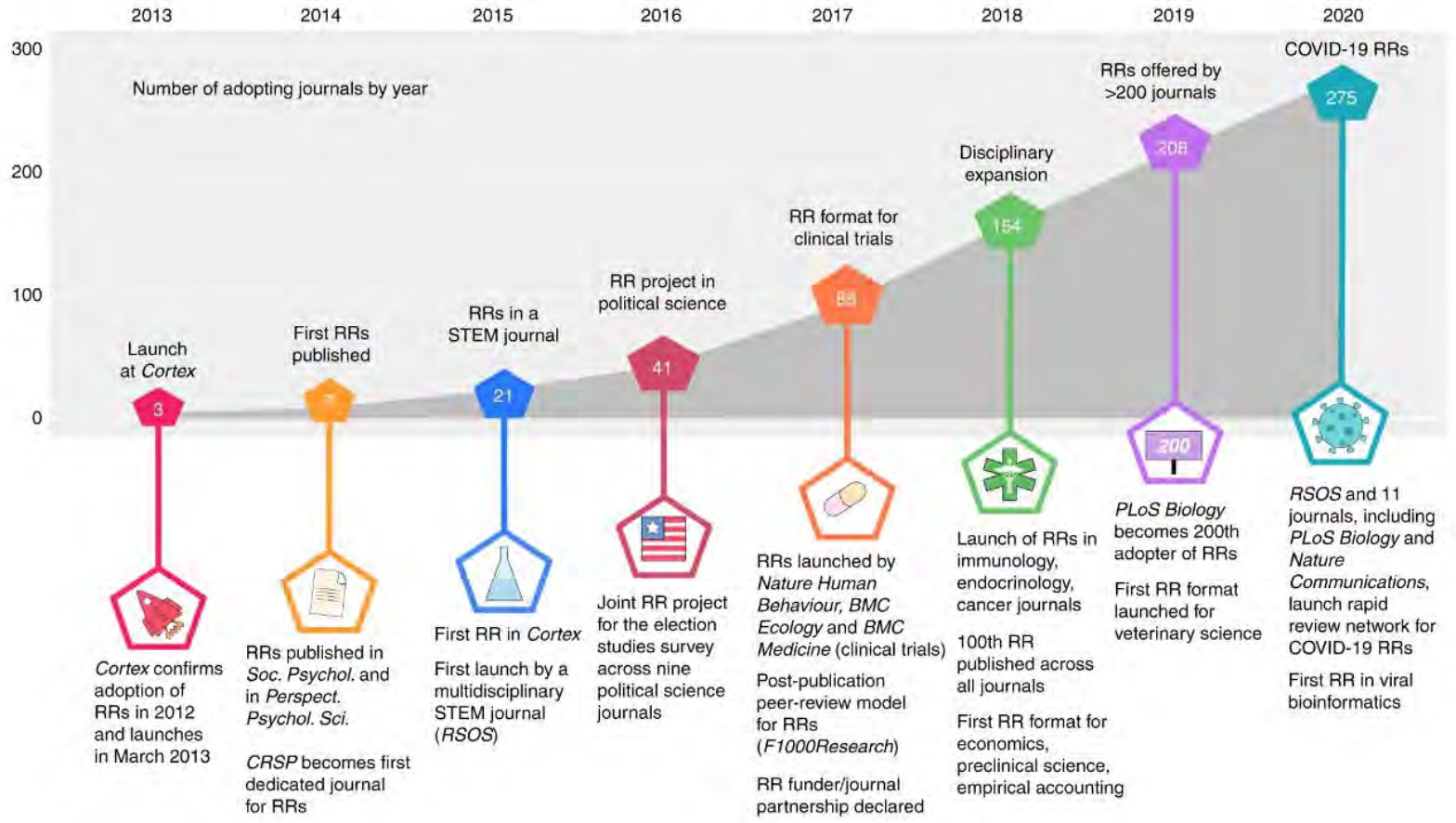
Timing: pushes back start date to wait for review (although review can be scheduled in advance with PCI-RR)

Rigidity: may not be easy for iterative multi-study papers or very loosely-defined projects (although can use decision trees, or register final stage of a multi-study project)

Best suited for quantitative, hypothesis testing research (although qualitative work can still be RRs)

History of Registered Reports

- First proposed 1976 (European J of Parapsychology)
- Introduced in Cortex 2012
- Now available at 300+ journals



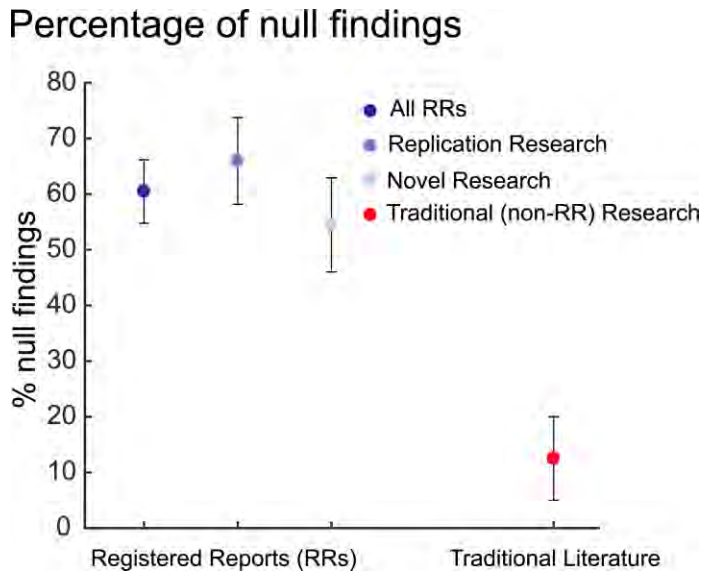
Are Registered Reports working as intended?

NEWS · 24 OCTOBER 2018

First analysis of 'pre-registered' studies shows sharp rise in null findings

Logging hypotheses and protocols before performing research seems to work as intended: to reduce publication bias for positive results.

Matthew Warren



Hypotheses are ~5 times more likely to be **unsupported** in Registered Reports compared with regular articles

Allen C, Mehler DMA (2019) Open science challenges, benefits and tips in early career and beyond. PLOS Biol 17(5): e3000246. https://doi.org/10.1371/journal.pbio.3000246

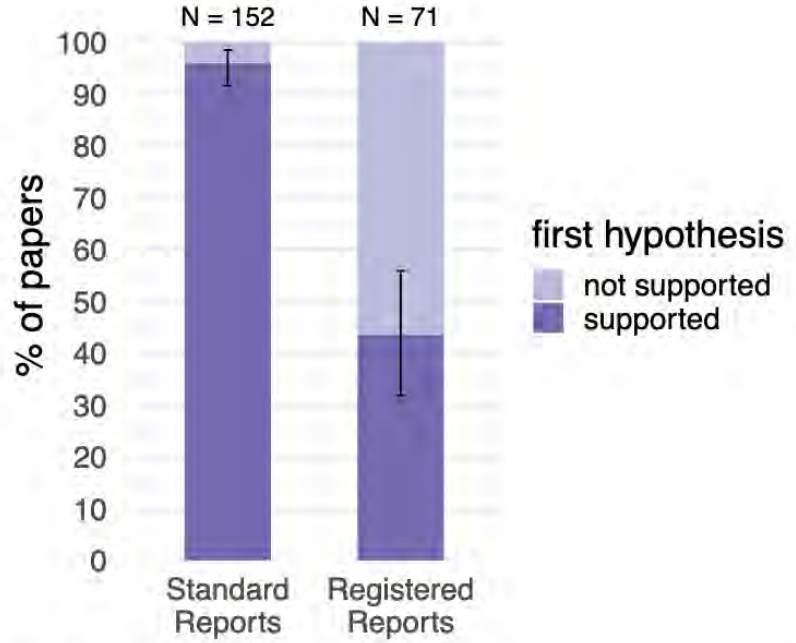


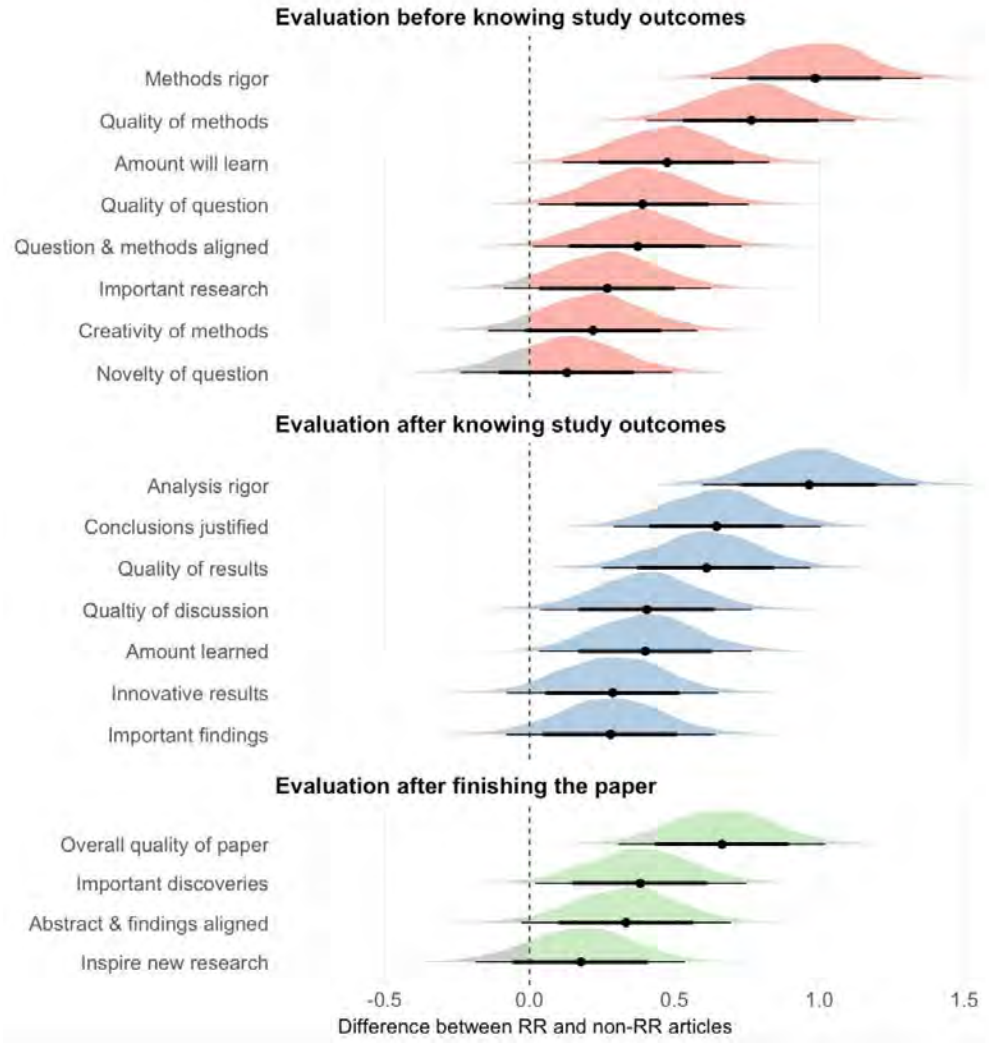
Figure 2. Positive result rates for standard reports and Registered Reports. Error bars indicate 95% confidence intervals around the observed positive result rate.

Same observation in RRs within psychology specifically

Scheel, Schijen & Lakens (2021)
https://journals.sagepub.com/doi/full/10.1177/25152459211007467

Slide courtesy Chris Chambers

Are Registered Reports working as intended?



ARTICLES
https://doi.org/10.1038/s41562-021-01142-4
nature human behaviour

Initial evidence of research quality of registered reports compared with the standard publishing model

Courtney K. Soderberg[1,6], Timothy M. Errington[1,6], Sarah R. Schiavone[2], Julia Bottesini[2], Felix Singleton Thorn[3], Simine Vazire[2,3], Kevin M. Esterling[4] and Brian A. Nosek[1,5]✉

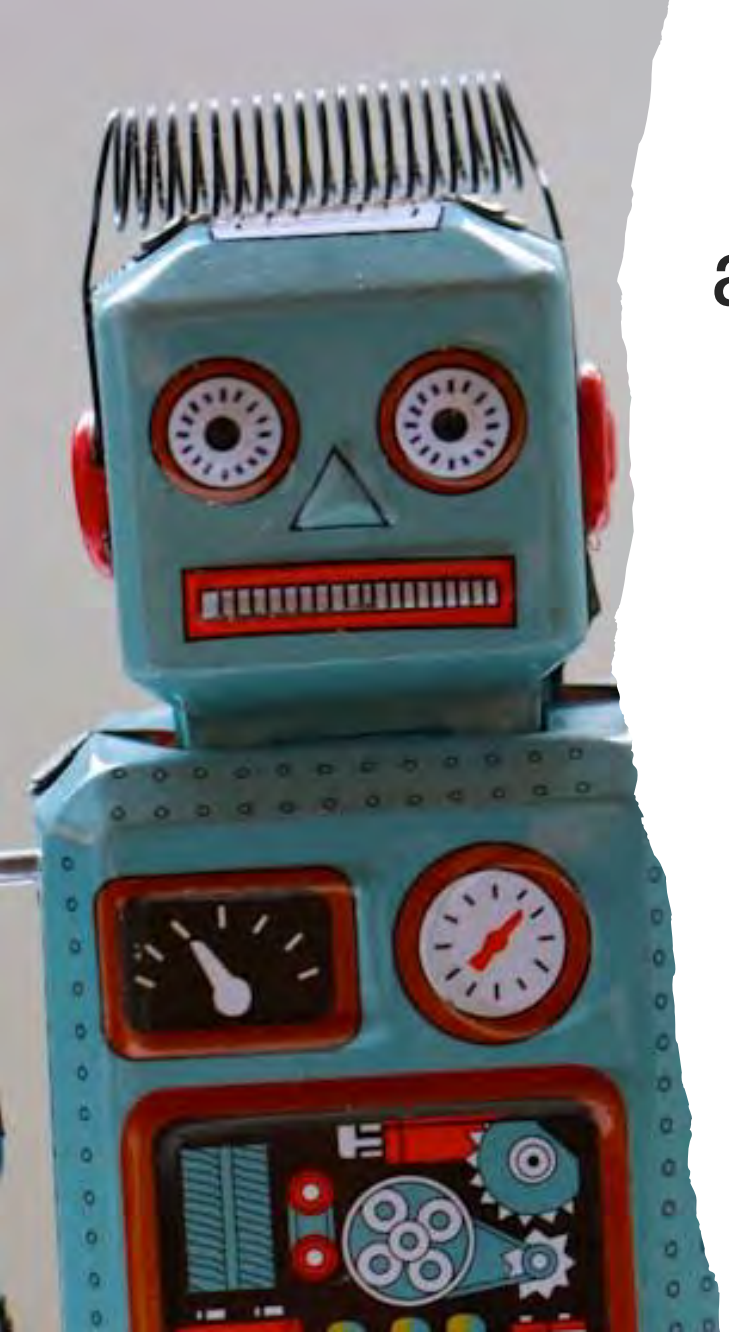
In registered reports (RRs), initial peer review and in-principle acceptance occur before knowing the research outcomes. This combats publication bias and distinguishes planned from unplanned research. How RRs could improve the credibility of research findings is straightforward, but there is little empirical evidence. Also, there could be unintended costs such as reducing novelty. Here, 353 researchers peer reviewed a pair of papers from 29 published RRs from psychology and neuroscience and 57 non-RR comparison papers. RRs numerically outperformed comparison papers on all 19 criteria (mean difference 0.46, scale range −4 to +4) with effects ranging from RRs being statistically indistinguishable from comparison papers in novelty (0.13, 95% credible interval [−0.24, 0.49]) and creativity (0.22, [−0.14, 0.58]) to sizeable improvements in rigour of methodology (0.99, [0.62, 1.35]) and analysis (0.97, [0.60, 1.34]) and overall paper quality (0.66, [0.30, 1.02]). RRs could improve research quality while reducing publication bias and ultimately improve the credibility of the published literature.

Soderberg, C. K., Errington, T. M., Schiavone, S. R., Bottesini, J. G., Singleton Thorn, F., Vazire, S., … Nosek, B. A. (2021). Initial evidence of research quality of registered reports compared with the standard publishing model. *Nature Human Behaviour* https://doi.org/10.1038/s41562-021-01142-4

Well cited – on average, cited same or slightly higher than regular articles

See Hummer, L. T., Singleton Thorn, F., Nosek, B. A. & Errington, T. M. Preprint: https://doi.org/10.31219/osf.io/5y8w7

Slide courtesy Chris Chambers



An imperfect solution for an imperfect environment

- Prereg and RRs are not panaceas, but they can be useful
- They wouldn't be necessary in ideal research environment
  - No practical need if we were all robots
  - No credibility need if we were all angels
- Designed for the system we currently have
  - e.g., RRs may change if publishing formats and norms change

Images from unsplash.com

Alternatives to preregistration or RRs?

- Nothing rivals the transparency of a timestamped plan
- But other practices can improve credibility:
  - Triangulation
  - Multiverse analysis
  - Open peer review

FAQ and concerns

1

“But what if I want to do exploratory analyses?”

(Prereg takes the ingenuity out of science.)

You can do (and report) as many exploratory analyses as you want – as long as these are labeled “exploratory” and separated from the confirmatory analyses in your report

2

“But what if I make a mistake or change my mind?”

Before data collection: you can easily revise it
After data collection: can still do alternative (perhaps more appropriate) analyses in addition to planned ones (justify why these are more appropriate)

For more details, see: https://cos.io/blog/preregistration-plan-not-prison/

3

“But what if my analysis depends on how the data turns out? I can’t prereg every possible analysis choice”

That’s ok – you can preregister a decision tree of how your analysis will change given possible data outcomes.

You can also preregister sequentially

No prereg will be perfect – you can catalogue your deviations from plan

4

“But what if others read my prereg and steal my idea?”

You can avoid getting scooped by setting an embargo on your project until your anticipated completion date

Also, timestamps on the prereg can help show your claim to an idea

5

“But what if I'm using existing data?"

Yes, you can still preregister if someone else collected the data already. It helps if you can give evidence that you haven't seen the data yet.

Hard to make a convincing prereg if you have already seen the data, though.

There are templates for "existing data" preregistrations on OSF

6

“But what if I don’t have time?" /
“But prereg is just extra work”

Yes, prereg takes time, as it forces you to think about your design!

Prereg moves the workload earlier (before data collection) – and can actually save time by improving design and reminding of analysis plan

Preregistration takes practice

Trends in Cognitive Sciences
Volume 23, Issue 10, October 2019, Pages 815-818

Scientific Life

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], Simine Vazire [7]

Show more

https://doi.org/10.1016/j.tics.2019.07.009

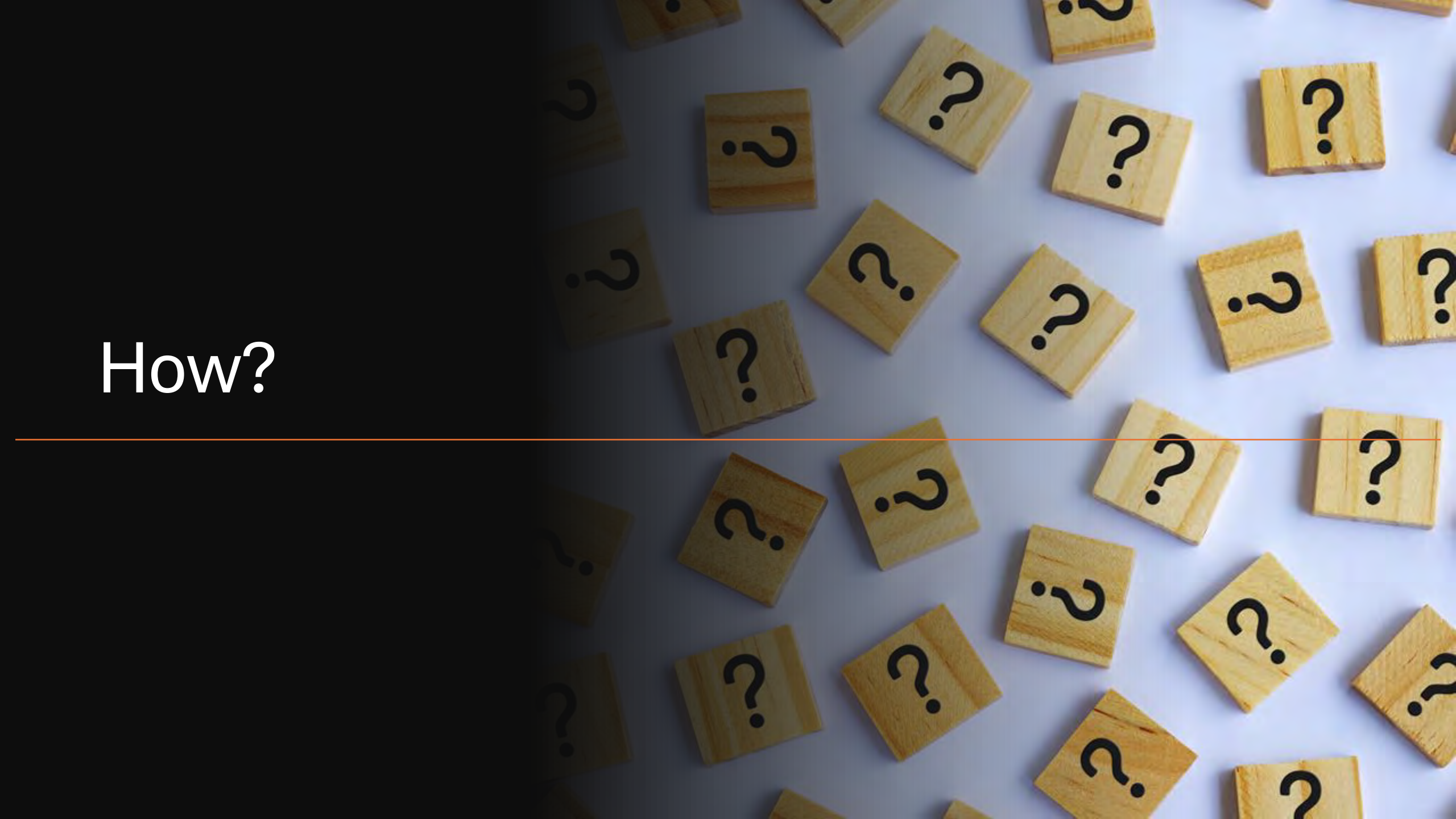
Get rights and content

Preregistration clarifies the distinction between planned and unplanned research by reducing unnoticed flexibility. This improves credibility of findings and calibration of uncertainty. However, making decisions before conducting analyses requires practice. During report writing, respecting both what was planned and what actually happened requires good judgment and humility in making claims.

doi.org/10.1016/j.tics.2019.07.009

Short break

How?



Central points:

- It's a Wild West - few norms or required formats
  - (except for clinical trials, which have 'bare bones' requirements)

- Follow the 'spirit of the law' - when in doubt, use your judgement to best serve principles of:
  - Transparency
  - Reducing your 'researcher degrees of freedom'

Is preregistration right for my project?

- Writing a detailed protocol is always worth the time
  - Consider piloting your project, to hone methods and analyses
- Decide whether to preregister, do a RR, or neither
  - How much does your field (and yourself) value credibility?
  - Does your study test hypotheses? (prereg/RRs especially useful)
  - Can you wait to start your study? (RR possible; if not, prereg)
  - Do you have strict ethics requirements? (RR may be difficult)
  - Is your study completely exploratory and ill-defined? (prereg/RR difficult)
  - Is it a multi-study project where each step depends on the last? (series of prereg easier than RR; you can still do a RR for the last study)
  - Are you worried reviewers may reject your study due to its possible results? (do a RR)
  - Would your study benefit from pre-study peer review? (do a RR)
  - Would *you* benefit from having an accepted paper on your CV even before it is run? (do a RR)

Is preregistration right for my project?

- So what happens if you’re unsure?
  - you have some hypotheses, and many possible ways of analysing, but not sure which is the ‘best’ without seeing the data?
- Ideally, design an exploratory pilot and a confirmatory preregistered replication
- Or, simulate data based on similar previous studies
- And/or, make a compromise (just be transparent!)
  - balance constraining your degrees of freedom with being honest about what details you haven't planned yet

What elements go into a preregistration?

- Hypotheses / research questions
  - What is my study trying to find?
- Methods
  - How will I investigate my questions / collect evidence?
- Analysis plan
  - How will I analyse and interpret the evidence?

Hypotheses / Research Questions

What is your research question?

- How could it be improved? – is it too general/too precise

Hypotheses

- Can you formulate specific predictions?
  - E.g. X will be bigger than Y
  - X will be bigger than zero
  - X will vary systematically with Y
- Are predictions directional? (-> 1 or 2-tailed test)
- How will you test each hypothesis? (clearly link each H to a test in your Analyses)
- NUMBER YOUR HYPOTHESES

Methods

- Sample size: give a rationale
  - Power analysis (e.g., GPower, or simulate data)
  - Other constraints (time, money, availability)
- Exclusion criteria
  - What order will exclusion rules apply in?
- How will you measure your variables?
  - Curated list of resources on scale development, validity, and psychometrics: osf.io/zrkd4/

Analysis

- Label each analysis with which hypothesis it tests
- Try simulating data before you preregister
  - Run your planned analyses on the simulated data
  - Check the outcomes for problems
  - See: https://osf.io/kz52v/ for a workshop teaching data simulation in Excel and R
- In case you get null effects:
  - consider Bayesian analysis
  - or equivalence testing

What makes a good preregistration?

- Be as precise and thorough as possible:
  - Have I limited my “researcher degrees of freedom” as much as possible?
  - If I gave this document to another researcher, could they run the study to my liking?
  - If somebody wanted to undermine my findings, could they poke any holes in this preregistration? (Imagine you are your worst scientific enemy)
- But don't hem yourself in unnecessarily
  - Be as vague/broad as your plans or expectations actually are
- And **use future tense**!
  - make it clear this is a *pre*registration

The Importance of Clear Instructions

Youtube link

Precise Preregistration Exercise

Your mission:

Think of ways to follow this plan that would result in different choices than intended by the person who wrote this sentence in the preregistration.

Make small groups of 2-3 (try to have a range of expertise)

Based on an exercise created by Anna E. van ‘t Veer, David Mellor, Chris C. Martin, Katie Corker, Stephen Lindsay, Simine Vazire, Daniel J. Simons

Snippets

1. *“We expect that drinking beer will increase reaction time”*
2. *“We expect to collect data from 100 subjects.”*
3. *“After arrival in the lab, participants will play the ultimatum game on a computer.”*

Think of ways to follow this plan that would result in different choices than intended by the person who wrote this sentence in the preregistration

Snippet 1 (hypotheses)

“We expect that drinking beer will increase reaction time”

1) For whom? What is the population to generalise to?
2) By how much? What is the minimum effect size of interest?
3) How much beer will do the trick? (and with what alcohol level, etc.)
4) Will participants be a place, like a bar or living room, where people typically drink beer? Or will they be in a laboratory?
5) … which hypothesis is this? Number them!
6) …compared to what? Is there a control group, or is it within-subjects?

Alternative:
H1. For male psychology students, drinking 5 Magic Hat IPAs will increase their reaction time as measured by machine X. We expect that the group that drinks 5 IPAs will respond at least 1 second slower, on average, than the group that did not drink alcohol.

Snippet 2 (sample size)

“We expect to collect data from 100 subjects.”

1) Does that mean before or after exclusions?
2) And, if it means "after exclusions," how do you continue testing if the exclusions bring you under 100. Do you test more than 100 initially?
3) What happens if more people show up for your study than you expected so that you test 110 rather than 100. Do you include those subjects or exclude them?
4) Do you schedule and test each participant individually, or are they scheduled in groups?
5) If you have unexpectedly high levels of exclusions, are there any conditions under which you would stop with fewer than 100 participants?
6) if you have multiple groups, how will random allocation take place? And what do you do when that leaves you with too few participants in one group?

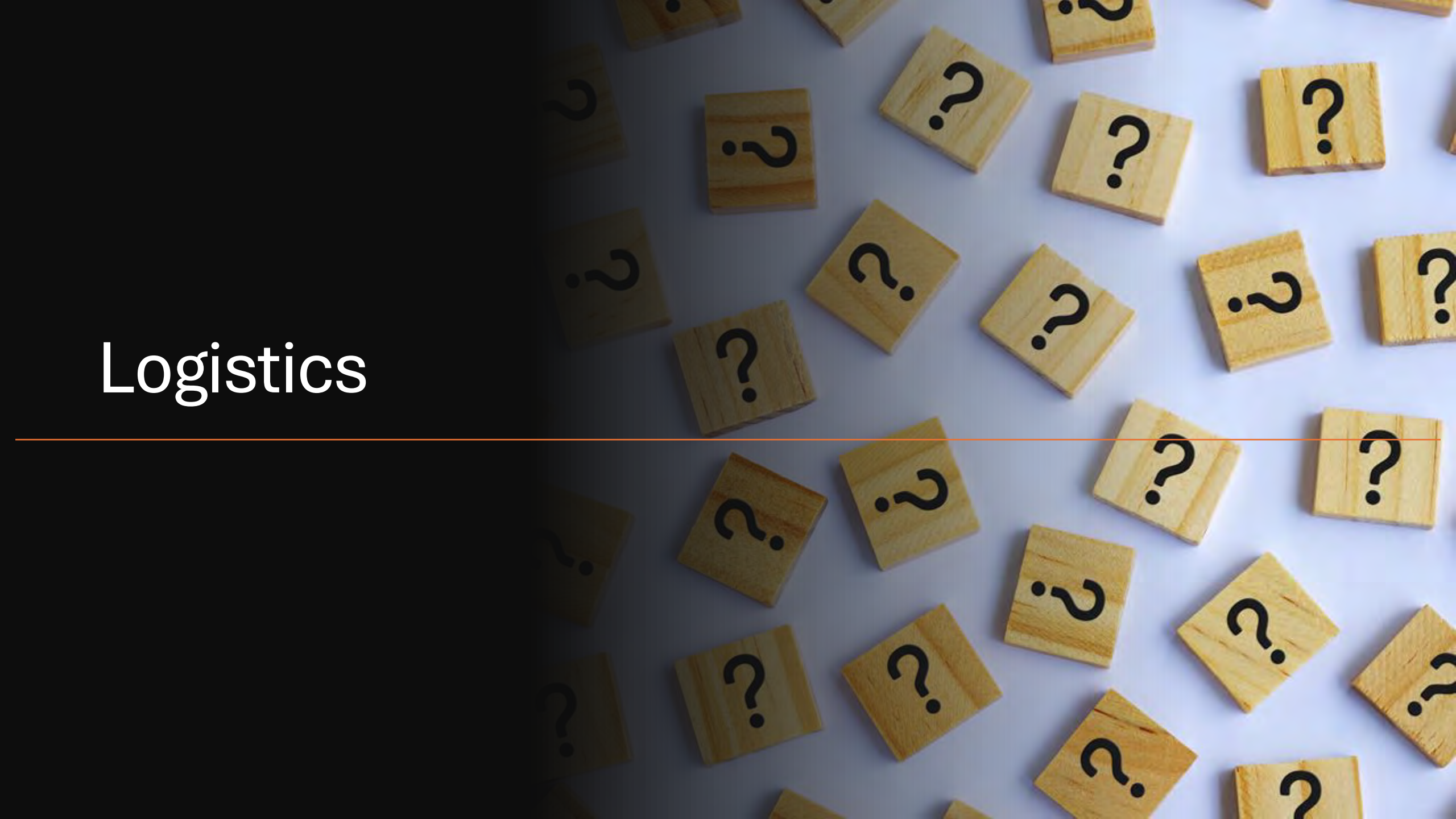
Alternative:
We will over sample by 15% in order to account for possible exclusions after we apply exclusion criteria 1 and 2 (see xxx), after 115 participants have started with the study, the computer will redirect the next participants to another task.

Snippet 3 (testing setting)

“After arrival in the lab, participants will play the ultimatum game on a computer.”

Ambiguities:
1) individual closed cubicles?
2) large enough group to ensure anonymity?
3) does it matter if participants come in with friends?
4) what do you tell them when they arrive?
5) who will greet them (requirements to experimenter?)
6) Does the lab have standard procedures (e.g. take away their phones?)
7) Will instruction texts be shared (like screencaptures)
8) Who will they play the game with? Other participants?

Logistics



When do I preregister?

The earlier, the better! (Must be before data analysis)

You might preregister:

- Before you've collected any data
- Before your next round of data collection
- After you're asked to collect more data during peer review
- Before you start analyzing an already existing dataset (secondary data)

You can also embargo preregistrations if you'd like to keep the details of your preregistration private for a certain period of time.

Where do I preregister?

Do **not** preregister on your personal or institutional website. Here are some options, though there are others:

- OSF
- American Economic Association (AEA) RCT Registry
- Animal Study Registry
- AsPredicted
- ClinicalTrials.gov
- GitHub/GitLab/Codeberg
- International Clinical Trials Registry Platform (ICTRP) by the World Health Organization
- Preclinicaltrials.eu
- Registry of Efficacy and Effectiveness Studies (REES)
- Systematic review registries: e.g., PROSPERO (health), IDESR (education)
- Zenodo

What formats to use

- Template or not? It's your choice

- **Option 1**: use a template, either more general or one developed for your specific methodology/ approach
  - Advantages: structure, guidance, rigour
  - Recommended for beginners

- **Option 2**: write a free-form document that covers all necessary points
  - Advantages: tailored for your needs
  - Recommend that you still consult a template to check what to include, and delineate sections

Comparing sampling questions across templates

AsPredicted.org Template

Sample Size

How many observations will be collected or what will determine the sample size? No need to justify the decision, but be precise about exactly how the number will be determined.

Qualitative Template

Stopping criteria *

Please describe the criteria or rationale behind when you will stop data generation or collection. Possible criteria include (but are not restricted to): data saturation*, when inclusion criteria are satisfied, resource constraints (e.g. time/funding), or when the analysis has produced an enriching answer to the research question(s).

Show example

Social Psychology Template

Data Collection *

Indicate where, from whom and how the data will be collected.

Sample Size *

Justify planned sample size

Power Analysis File

If applicable, you can upload a file related to your power analysis here (e.g., a protocol of power analyses from G*Power, a script, a screenshot, etc.).

Where can I find templates?

The OSF currently has templates for:

- General
- Qualitative research
- Psychological replications
- Registered Reports
- Secondary data analysis
- Social psychological research
- Systematic reviews
- *fMRI
- *Modeling

https://help.osf.io/article/229-select-a-registration-template

*Community-made templates: https://osf.io/zab38/wiki/home/

What journals accept Registered Reports?

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

Other journals offer some features of the format.

You can see the full list of known participating journals here: www.cos.io/rr

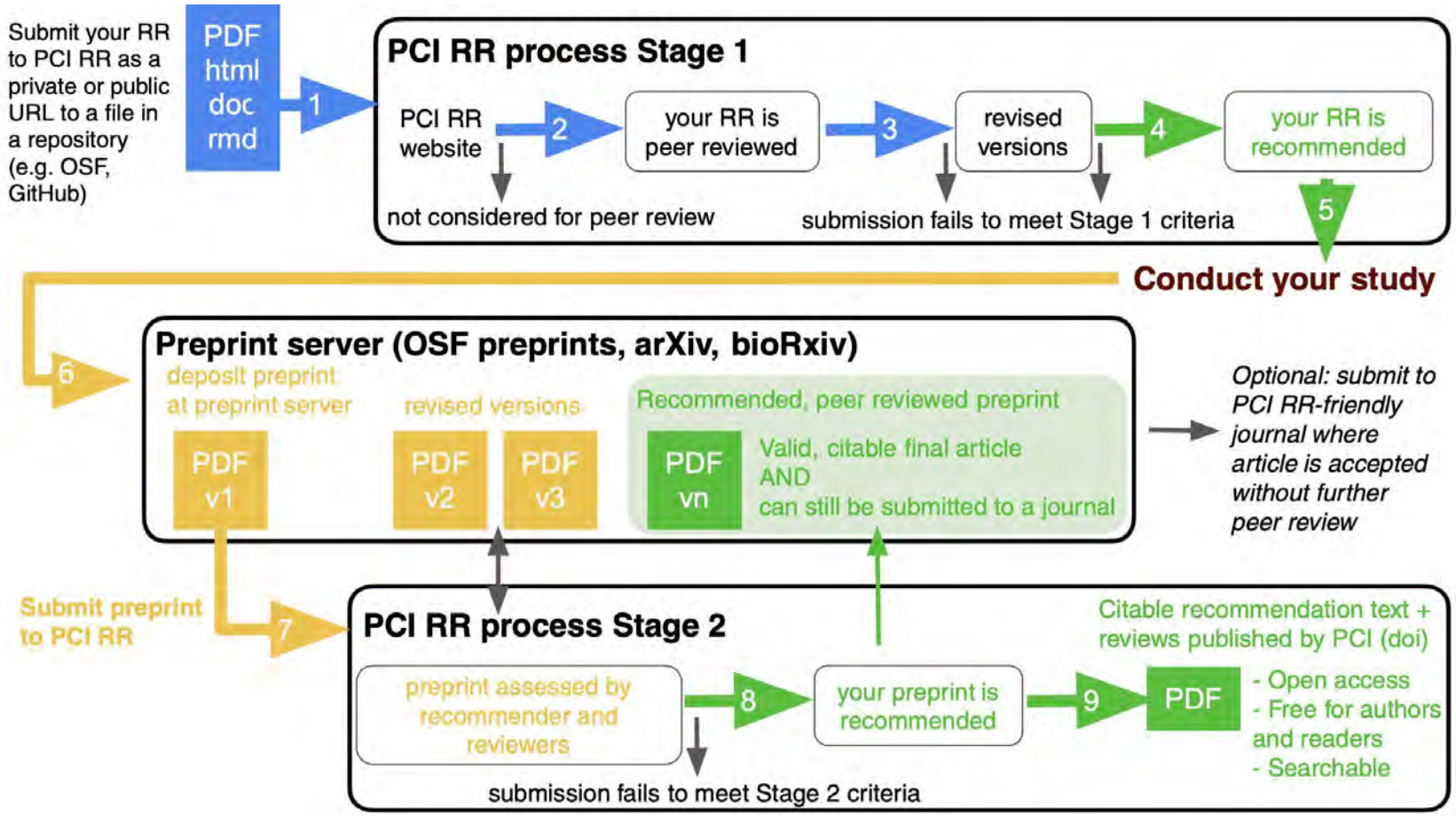
You can also ask a journal (not on this list) if they will accept a RR (some will!)

You can also submit your RR to Peer Community In Registered Reports: https://rr.peercommunityin.org/

Peer Community In

Registered Reports

Free and transparent pre- and post-study recommendations across research fields



What do I do in the final manuscript?

Link to the preregistration

List all preregistered hypotheses

Report results of all prespecified analyses

Distinguish between planned and unplanned analyses

Reporting deviations

Include a section titled “Deviations to the planned study design” or “Transparent changes.”

Make sure to describe:

- Problems with data, missing data, more advanced methods used than predicted
- Changes to the sampling plan
- Changes to the preregistered research design plan

Examples of documenting prereg

EEG (https://elifesciences.org/articles/73930

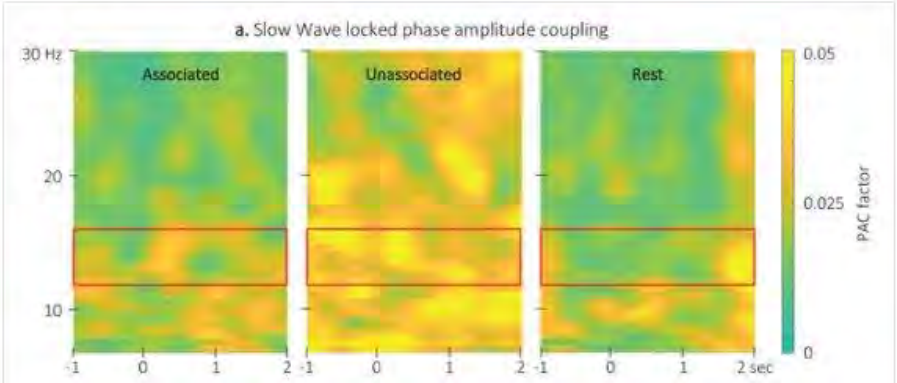
- well-organised prereg (numbered hypotheses)
- list of deviations provided
- Clearly delineated exploratory analyses

Materials and methods

This study was pre-registered in the Open Science Framework (https://osf.io/). Our pre-registration document outlined our hypotheses and intended analysis plan as well as the statistical models used to test our a priori hypotheses (available at https://osf.io/y48wq). Whenever an analysis presented in the current paper was not pre-registered, it is referred to as *exploratory*. Additionally, to increase transparency, any deviation from the pre-registration is marked with a (#) symbol and listed in Supplementary file 3 together with a justification for the change.

Event-related phase-amplitude coupling (ERPAC) analyses were performed across channels on a wider frequency range (7–30 Hz) for completeness; thus, analyses outside the pre-registered sigma band (see red frame in Figure 6) are considered exploratory. The ERPAC values locked to the *auditory cues* were compared between the two stimulation conditions. The CBP test did not highlight any significant clusters (alpha threshold = 0.025, cluster p-value = 0.44). The preferred coupling phase, which represents the phase at which the maximum amplitude is observed, did not significantly differ between conditions ($F(1,46) = 0.3$, p-value = 0.9). These results suggest that the stimulation conditions did not influence the coupling between the phase of the slow oscillations and the amplitude of sigma oscillations at the auditory cue.

Figure 6 with 3 supplements



Targeted Memory Reactivation impacts on electrophysiological sleep signatures involved in motor memory consolidation.

Open practice resources

Data
Analytic code
Materials
Papers

Study Information

Title

The effect of Targeted Memory Reactivation on electrophysiological sleep features involved in motor memory consolidation.

Authors

Description

The fascinating ability to form memories underlies the building of our identity, knowledge as well as our motor and perceptual skills. This function is thus inextricably linked to the efficient performance of everyday life activities. Important discoveries over the last several decades have significantly enhanced our understanding of the neurophysiological mechanisms underlying memory formation and consolidation, i.e. the process by which labile memory traces become more robust. In the present study, we will adopt the acquisition and consolidation of movement sequences as a model to study the neural processes underlying memory. Motor sequence learning (MSL) is ideal for the proposed research because it involves integrating the temporal structure of a series of stereotyped movements into a unitary, well-rehearsed sequence and thus is the basis for the execution of many daily activities (e.g., typing). It also is a dominant motor learning paradigm in the field and, accordingly, both behavioral and neural correlates of these processes have been extensively characterized in young adults. Briefly, initial acquisition of a movement sequence, occurring during online practice of the task and characterized by a substantial improvement in performance, is followed by a slower phase in which smaller improvements emerge across multiple practice sessions. Importantly, the consolidation phase, occurring offline, between practice sessions, offers a privileged time window for the acquired memory to be transformed

Contributors
Judith Nicolas, Bradley King, and Genevieve ALBOUY

Registration type
OSF Preregistration

Date registered
December 2, 2019

Date created
December 2, 2019

Associated project
osf.io/n3me9

Internet Archive link
https://archive.org/details/osf-registrations-y48wq-v1

Category
Project

Registration DOI
https://doi.org/10.17605/OSF.IO/Y48WQ

https://osf.io/y48wq

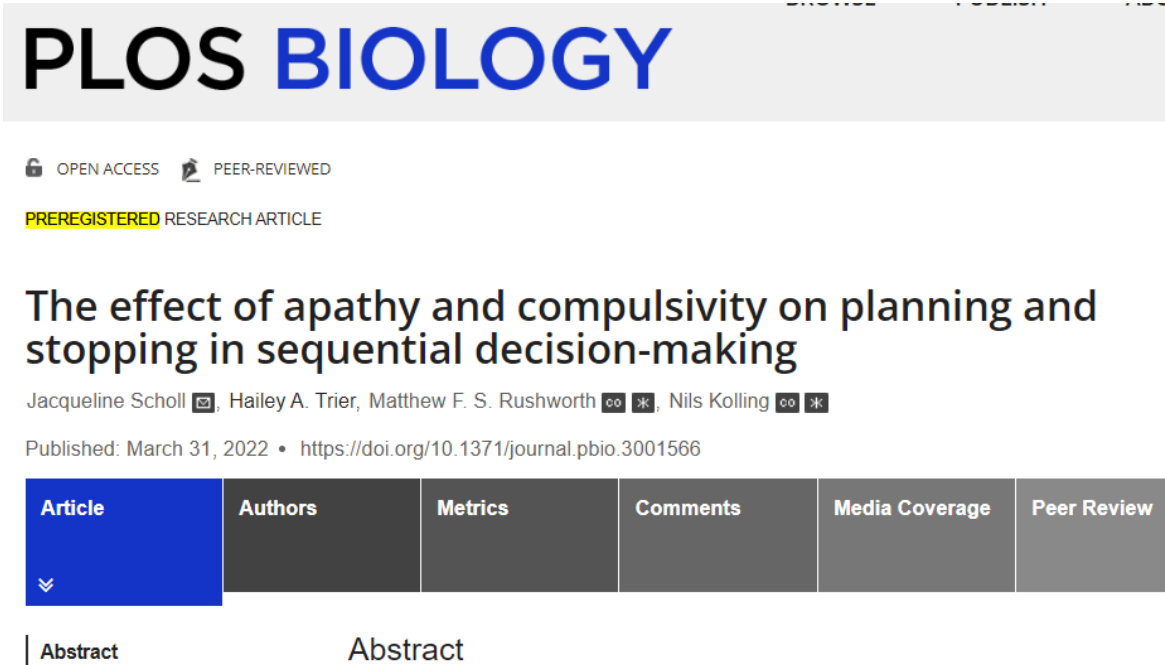
Supplementary file 3. List of the deviations from the pre-registered analyses followed by their justification. These deviations are marked with a # in the main manuscript.

	Pre-registered	Final report
1	Only right-handed participants	Both right- and **left**-handed participants
	Justification: Based on the bimanual nature of our motor task, we elected to not restrict our participant pool to only right-handers in order to facilitate recruitment (N= 2 left-handers).	
2	Pre-nap performance for offline gain computation on last 4 blocks of the MSL	Pre-nap performance for offline gain computation on last **3** blocks of the MSL
	Justification: See main manuscript for details. Briefly, against our expectations based on previous research using learning of a single sequence, participants only reached plateau performance on the two sequences starting on block 2 of the pre-nap test. In order to meet the performance plateau pre-requisite to compute offline gains in performance, we therefore excluded the first block of the pre-nap test and computed offline gains based on the last 3 blocks of the pre-nap test which showed stable performance levels for both sequences.	
3	We will classify auditory evoked responses into evoked SO if the standard criteria of a SO are met (negative peak ≤ -40 µV and the peak-to-peak amplitude ≥ 75 µV). Mean auditory-evoked SO amplitude will be computed for each subject in each condition separately.	Auditory-evoked responses were averaged **across all trials** for each condition. Mean auditory **ERP** amplitude was computed for each subject in each condition separately.
	Justification: The number of auditory ERPs reaching the pre-registered amplitude criteria was not sufficient to perform a powerful statistical analysis. This issue being highlighted in previous research (4), we followed similar procedures and averaged all the auditory-evoked responses (irrespective of their	

Examples of documenting prereg

- Behavioral:
  - exploratory and confirmatory sample
  - They mention they deviated
  - https://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.3001566

For data collection and analysis, we employed a "split sample" approach [33,34]. We first collected a discovery sample that we used to refine and develop hypotheses in a data-driven way. We then used a confirmation sample to test the preregistered hypotheses in a statistically rigorous way. This approach thus combines the benefits of preregistration—reduced risk of false positives due to analytical freedoms—with those of exploratory science—the analytical approach being best adapted to the specific data.


PLOS BIOLOGY

OPEN ACCESS PEER-REVIEWED

PREREGISTERED RESEARCH ARTICLE

The effect of apathy and compulsivity on planning and stopping in sequential decision-making

Jacqueline Scholl, Hailey A. Trier, Matthew F. S. Rushworth, Nils Kolling

Published: March 31, 2022 • https://doi.org/10.1371/journal.pbio.3001566

Article | Authors | Metrics | Comments | Media Coverage | Peer Review

Abstract

Abstract

Example of a 'failed' RR

- This RR did not uphold assumptions
  - o Clinical group did not show fMRI deficits expected
  - o But still useful for transparency

Statistical comparisons indicated that the two-factor model fit the data significantly better than the single-factor model, $\chi^2(13)=172.11, p<.001$, however neither pre-registered model was a good fit (TLI < .795, CFI<.856, SRMR>.065). We consequently examined the modification indices of both models to improve model fits. For both models, this indicated that expressive and receptive vocabulary scores, as well as the two narrative production measures (ERRNI initial and delayed recall) were strongly correlated with each other, with modification indices of>30. These correlations were subsequently modelled for both the single and two-factor models. In addition, for the single-factor

ELSEVIER

NeuroImage

Volume 226, 1 February 2021, 117599

Registered Report

Functional organisation for verb generation in children with developmental language disorder

Saloni Krishnan [a b], Salomi S. Asaridou [a], Gabriel J. Cler [a], Harriet J. Smith [a c], Hannah E. Willis [a d], Máiréad P. Healy [a e], Paul A. Thompson [a], Dorothy V.M. Bishop [a], Kate E. Watkins [a]

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Highlights

- We scanned the largest cohort of children with developmental language disorder to date.
- Our pre-registered predictions were not upheld.
- Children with DLD who accurately performed the verb generation task showed no functional abnormality.

https://www.sciencedirect.com/science/article/pii/S1053811920310843?via%3Dihub

My story: some personal examples

Preregistration

Preregistered each study of an iterative, multi-study paper

It improved each time – showed us our mistakes

Made analysis very simple (just followed the plan)

Knowledge of wealth shapes social impressions.

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Database: APA PsycA

Sarkar, Amar Nithyanand, Dhruv Sella, Francesco Sarkar, Radha Mäkelä, Ilari Cohen Kadosh, Ro | Elliot, Andrew J. Thompson, Jacqueline M.

Citation

Sarkar, A., Nithyanand, D., Sella, F., Sarkar, R., Mäkelä, I., Cohen Kadosh, R., Elliot, A. J., & Thompson, J. M. (2022). Knowledge of wealth shapes social impressions. *Journal of Experimental Psychology: Applied, 28*(1), 205–236. https://doi.org/10.1037/xap0000304

Abstract

Seven experiments conducted in India and the United States (N ~7,000; 5 preregistered) examined the effects of wealth on warmth and competence, 2 fundamental dimensions of social impressions. Wealth causally influenced perceptions of a target's competence: high wealth increased perceived competence and low wealth decreased perceived competence (Experiments 1–3). Furthermore, both high and low wealth reduced perceived warmth compared with control conditions that provided no wealth-related information (Experiments 2 and 3). Attributing prosocial tendencies to the target in the form of charitable donations reversed wealth-induced reductions in warmth, while low levels of charitable donations lowered both perceived warmth and competence (Experiment 3). Reciprocally, information about the target's competence or warmth influenced how wealthy they were perceived to be (Experiment 4). Knowing the source of wealth (e.g., entrepreneurship, corporate fraud, inheritance) also affected perceptions of competence and warmth (Experiments 5 and 6). Moreover, participants expressed greater willingness to hire wealthier targets compared with poorer targets in hypothetical employment scenarios, a relationship mediated by perceived competence, suggesting that an individual's wealth may influence consequential assessments and decisions (Experiment 7). With rising economic inequality, it is crucial to understand how wealthy and poor individuals are perceived and the implications of these perceptions. The present experiments offer insight in this direction. (PsycInfo Database Record (c) 2022 APA, all rights reserved)

Preregistration

Preregistered each study of an iterative, multi-study paper

It improved each time – showed us our mistakes

Made analysis very simple (just followed the plan)

Experiment	Preregistration Status (and number on aspredicted.org)	Planned effect size for 80% power, required minimum *n*/cell (actual minimum *n*/cell)	Total Final Sample Size[2]
1	No	Cohen's *d* = .25[1], *n* = 250 (206)	426
2	Yes (#3673)	Cohen's *d* = .35, *n* = 130 (131)	443
3	Yes (#4696)	Cohen's *d* = .25, *n* = 253 (265)	2,643
4	Yes (#5017)	Cohen's *d* = .35, *n* = 130 (151)	1,547
5	No	Cohen's *d* = .35, *n* = 130 (156)	317
6	Yes (#7771)	Cohen's *d* = .35, *n* = 130 (155)	831
7	Yes (#27075)	Small mediation effect, *a* path = .20, *b* path = .14, *n* = 320 (352)	734

Registered Reports

Submitted an (exploratory) experiment to a journal

They requested a replication experiment

I asked if it could be done as a registered report, on a tight timeline (funding running out)

Editor agreed!

Supervisor was convinced by idea of guaranteed publication

Differential effects of film genre on viewers' absorption, identification, and enjoyment.

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Database: APA PsycArticles

Thompson, Jacqueline M. Teasdale, Ben Duncan, Sophie van Emde Boas, Evert Budelmann, Felix Maguire, Laurie Dunbar, Robin I. M.

Citation

Thompson, J. M., Teasdale, B., Duncan, S., van Emde Boas, E., Budelmann, F., Maguire, L., & Dunbar, R. I. M. (2021). Differential effects of film genre on viewers' absorption, identification, and enjoyment. *Psychology of Aesthetics, Creativity, and the Arts, 15*(4), 697–709. https://doi.org/10.1037/aca0000353

Abstract

Marketers, filmmakers, and cinema-goers assume that genre has a large effect on how the audience responds to and engages with a film. However, trait measures such as transportability suggest that, in some cases, individual differences may shape audience engagement more than genre does. To investigate this disparity, we compared viewers' enjoyment, identification with characters, and story world absorption (including three subscales: Transportation, Attention, and Emotional Engagement) for film clips from two very different genres (an emotional family film vs. an action chase scene) in a within-subjects design. Across two studies—an exploratory study and a preregistered replication—we found that participants' feelings of being transported into the narrative (a dimension of story world absorption) were more highly correlated across films than other measures were and tended to be less related to genre preference than the other audience response measures were. This pattern of results suggests that feelings of transportation may be more dependent on individual differences, and less sensitive to genre, than other forms of audience response. An exploratory analysis of a short scale measuring trait transportability suggested this measure was not the basis of the individual differences theorized to underlie transportation. Our results further highlight the importance of examining viewer engagement with narrative as a multidimensional, rather than unitary, concept. (PsycInfo Database Record (c) 2021 APA, all rights reserved)

How to convince my supervisor? (or collaborators?)

- This can take some creativity!
- Key: figure out what matters most to them, and frame it that way
  - E.g. supervisor who only cares about publications - emphasise that IPA guarantees publication
  - Norms can also be powerful
- Make it concrete (write it first and show them the full draft)
  - Easier to say no/be scared when it's abstract

How to Register (and Update!) a Study on the OSF

CENTER FOR
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Getting Started with Preregistrations

https://osf.io/registries

Offline versions: https://bit.ly/osf-reg-template

Creating Your (Pre)Registration

https://osf.io/registries

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Registration Metadata

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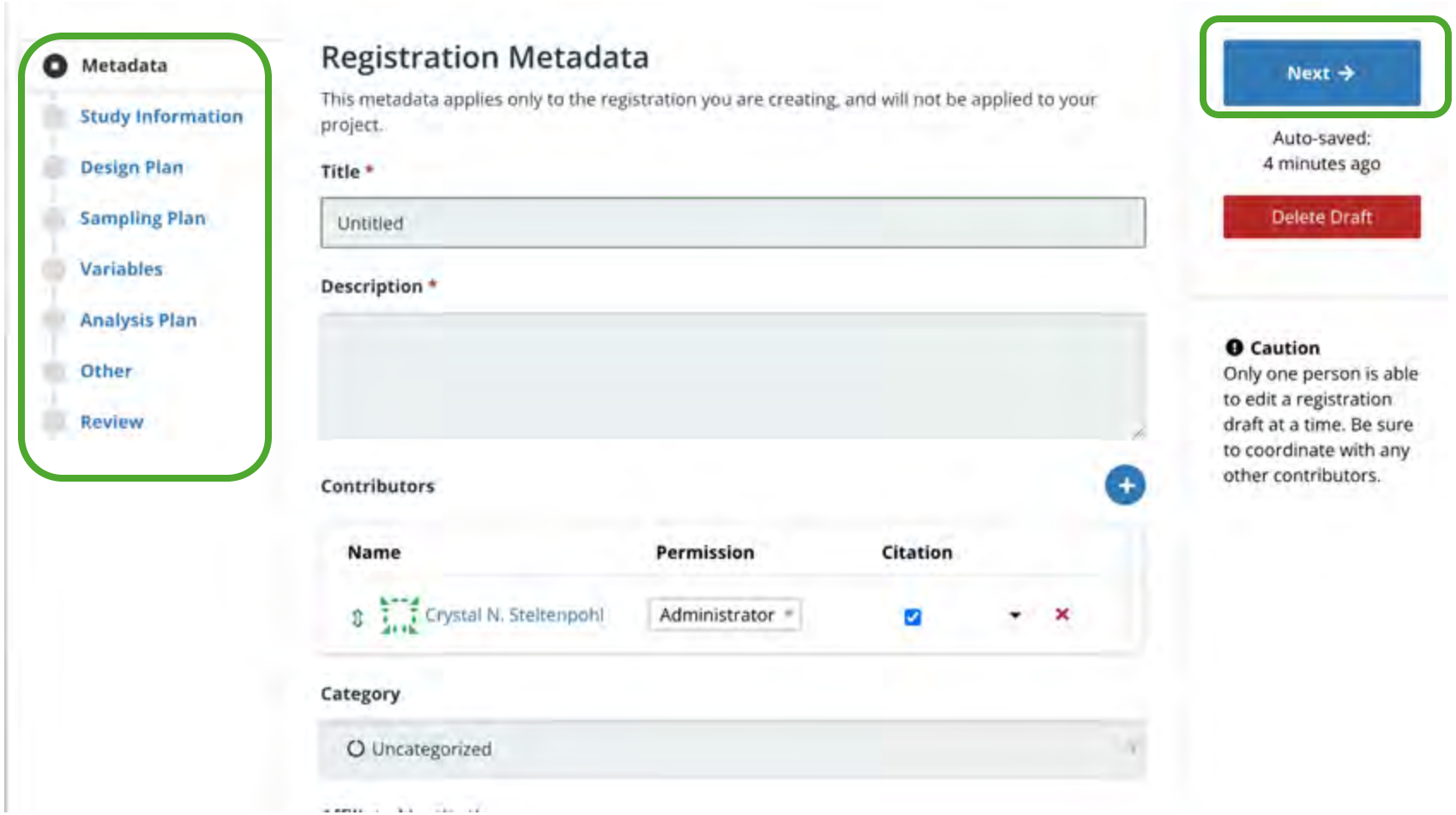

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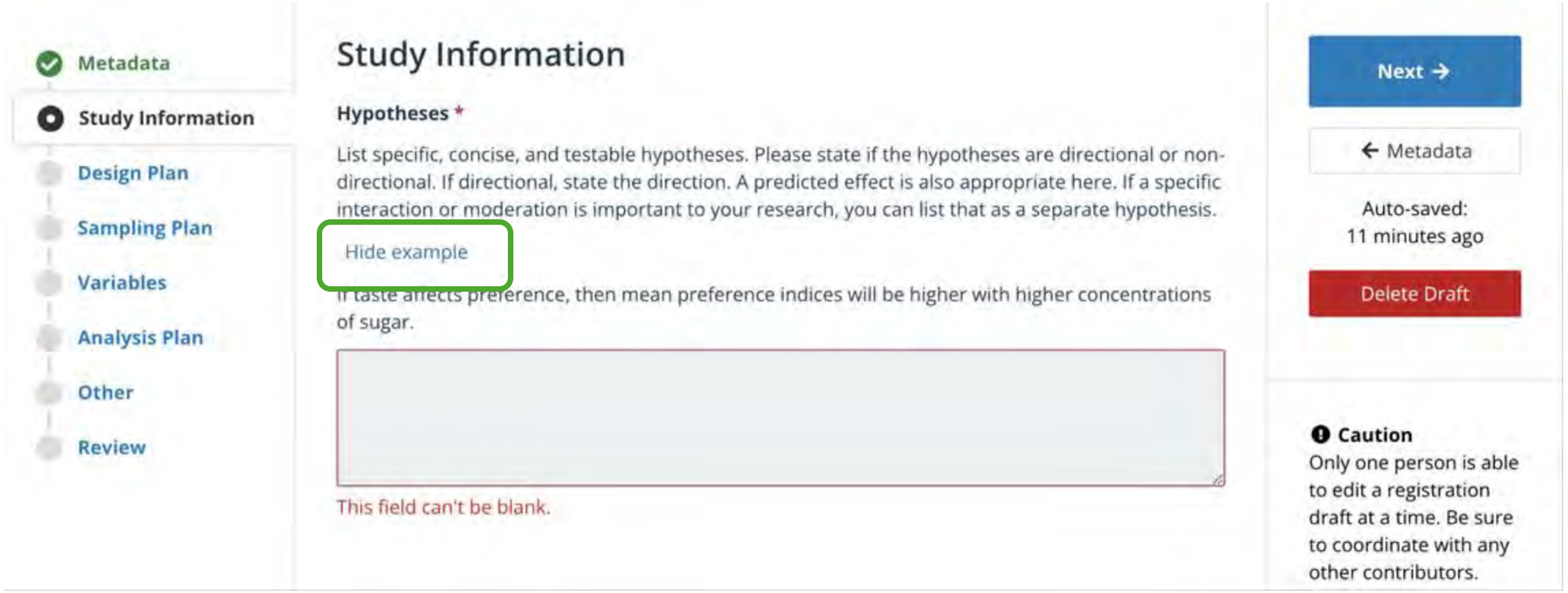

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Design Plan

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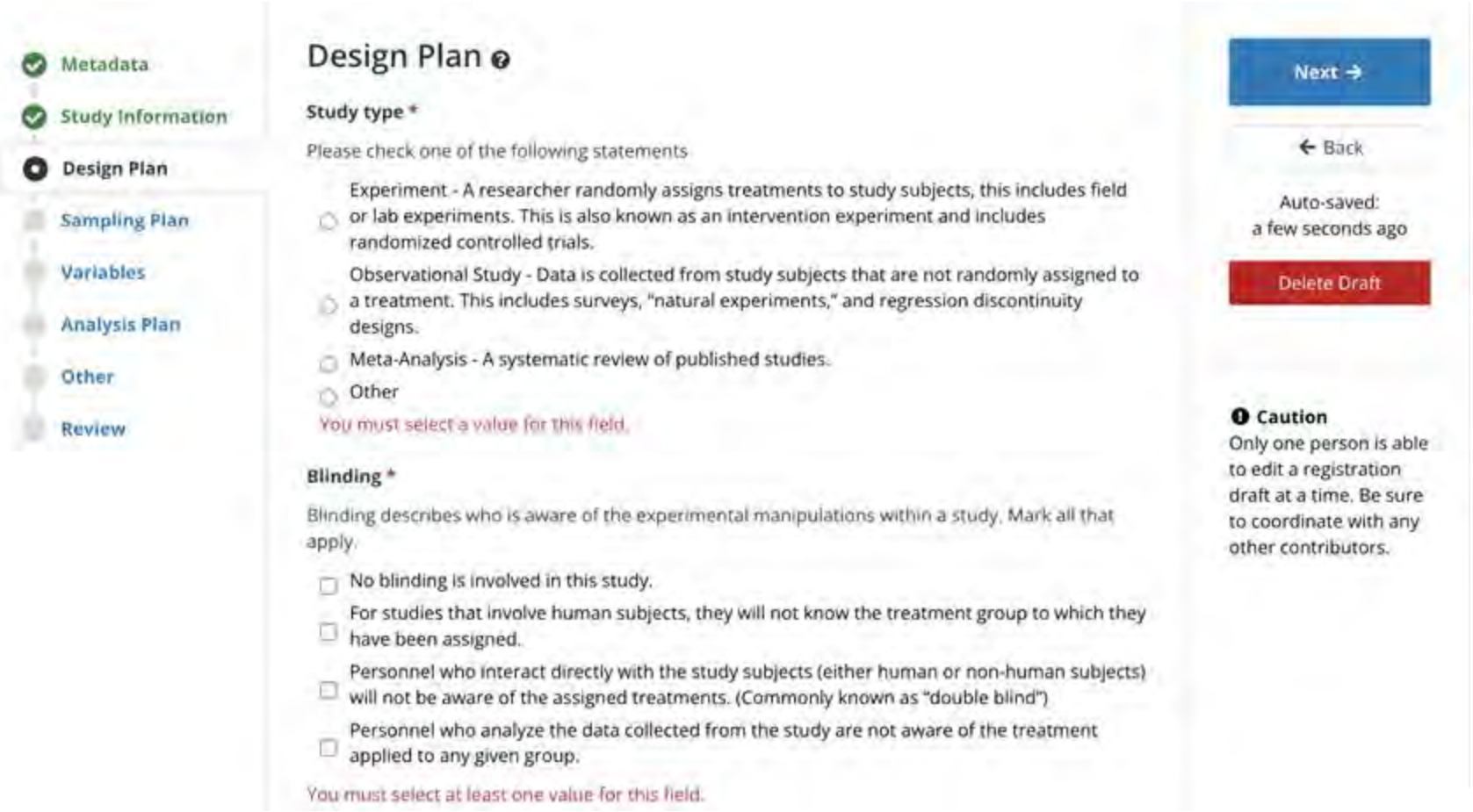

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Sampling Plan

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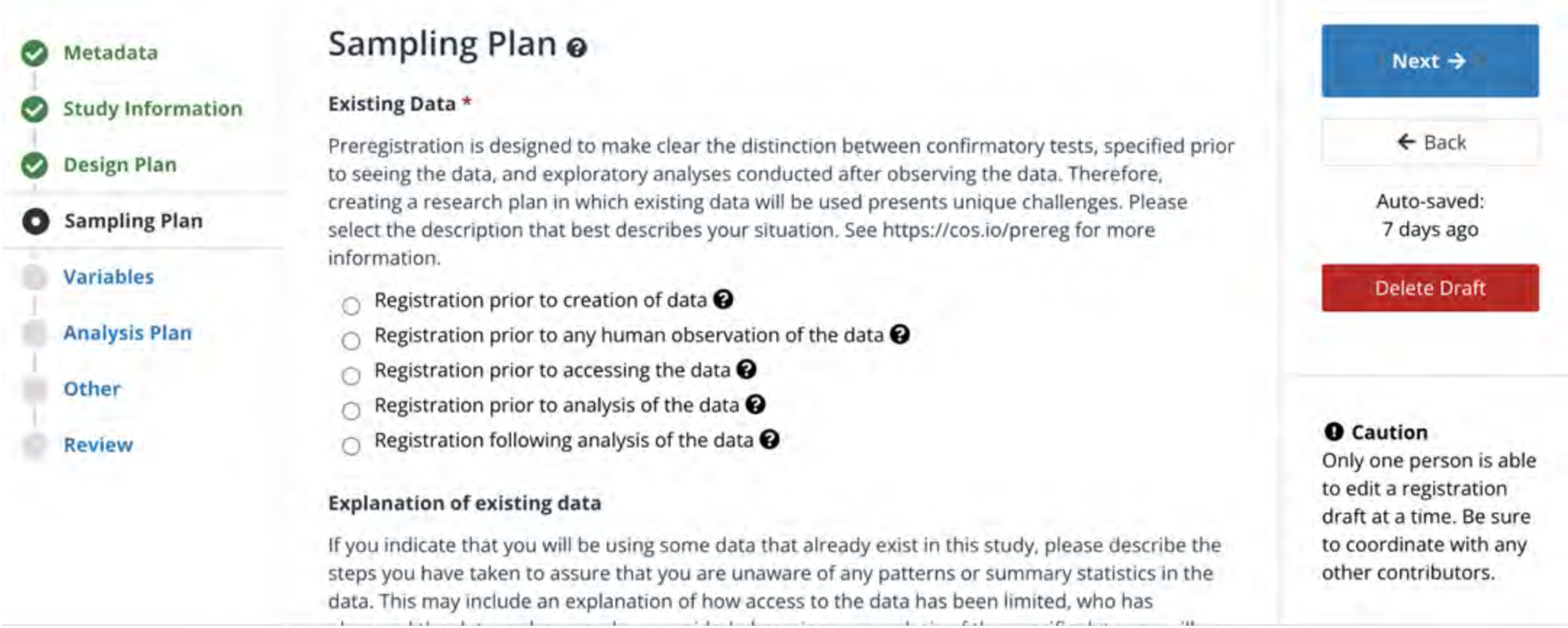

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Variables

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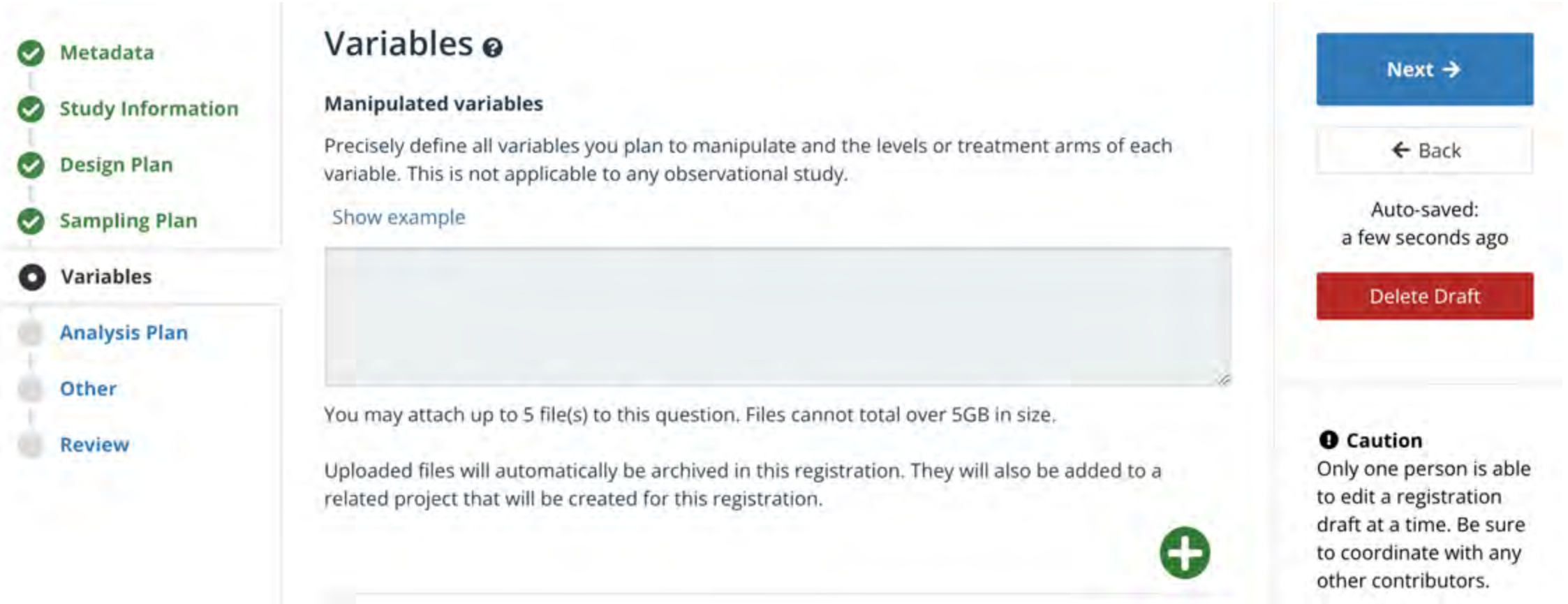

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Analysis Plan

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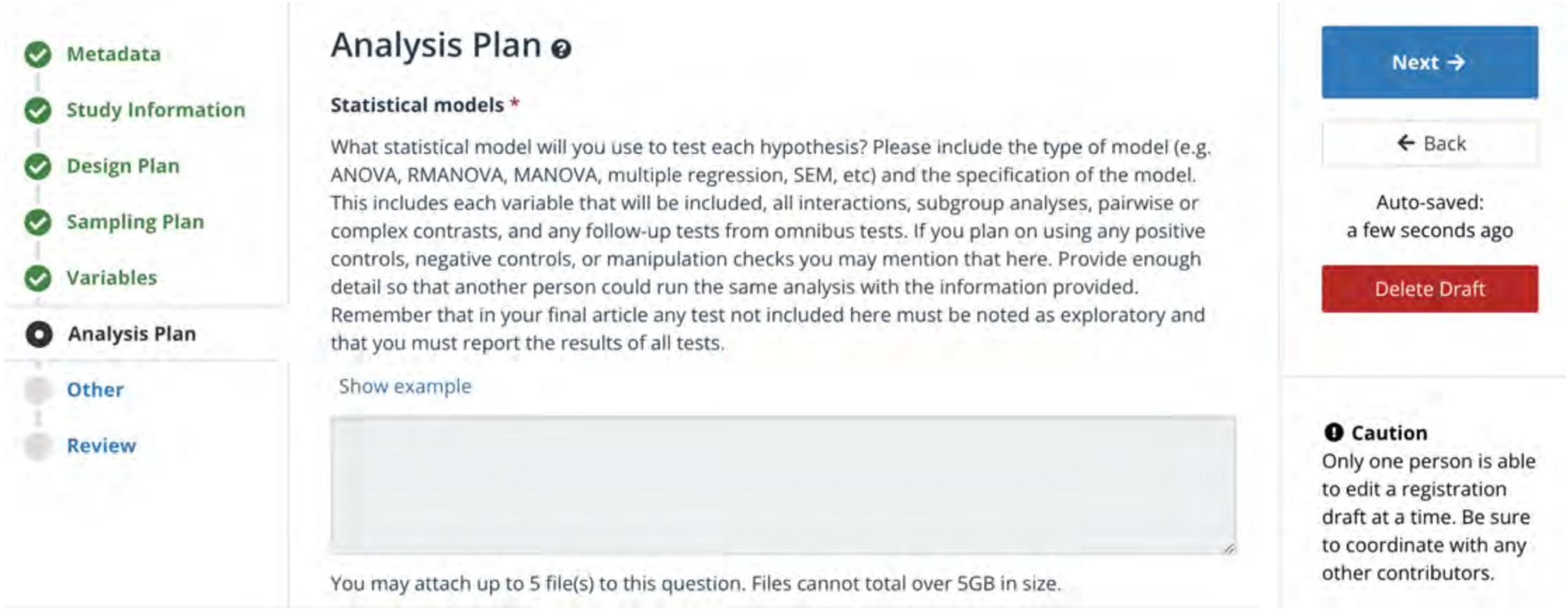

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Other

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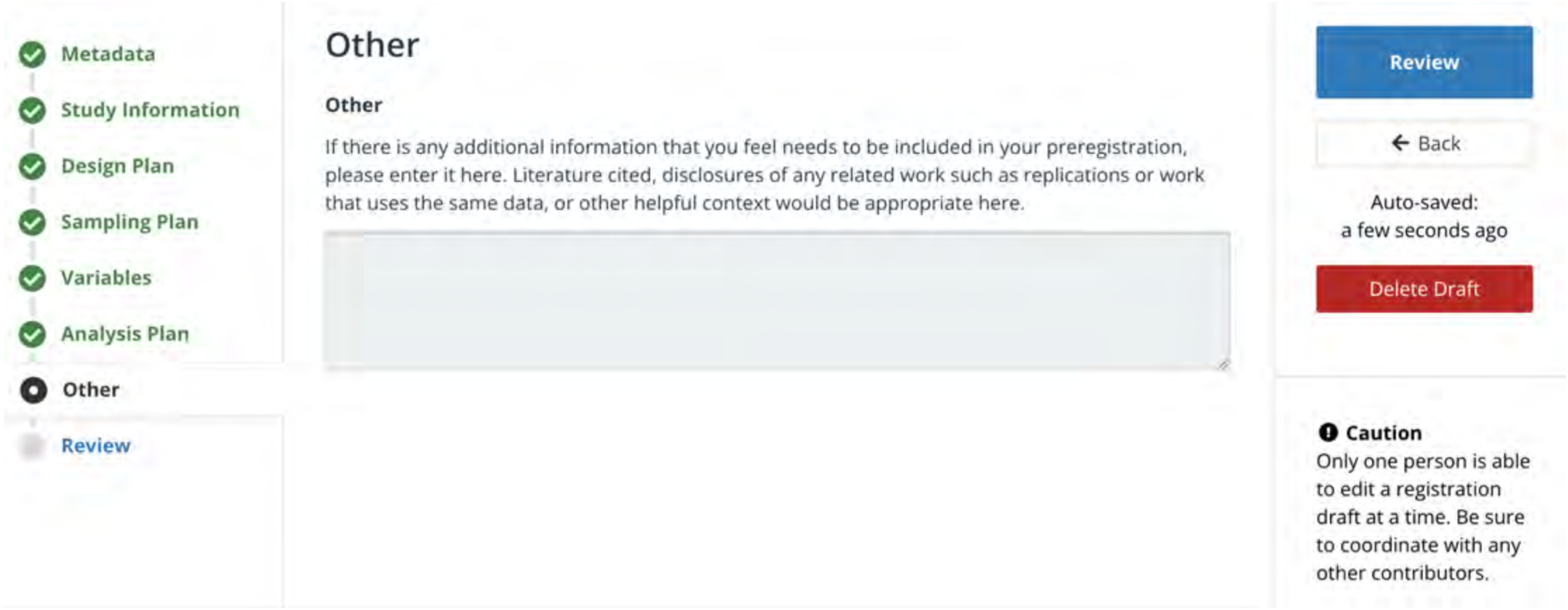

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Review

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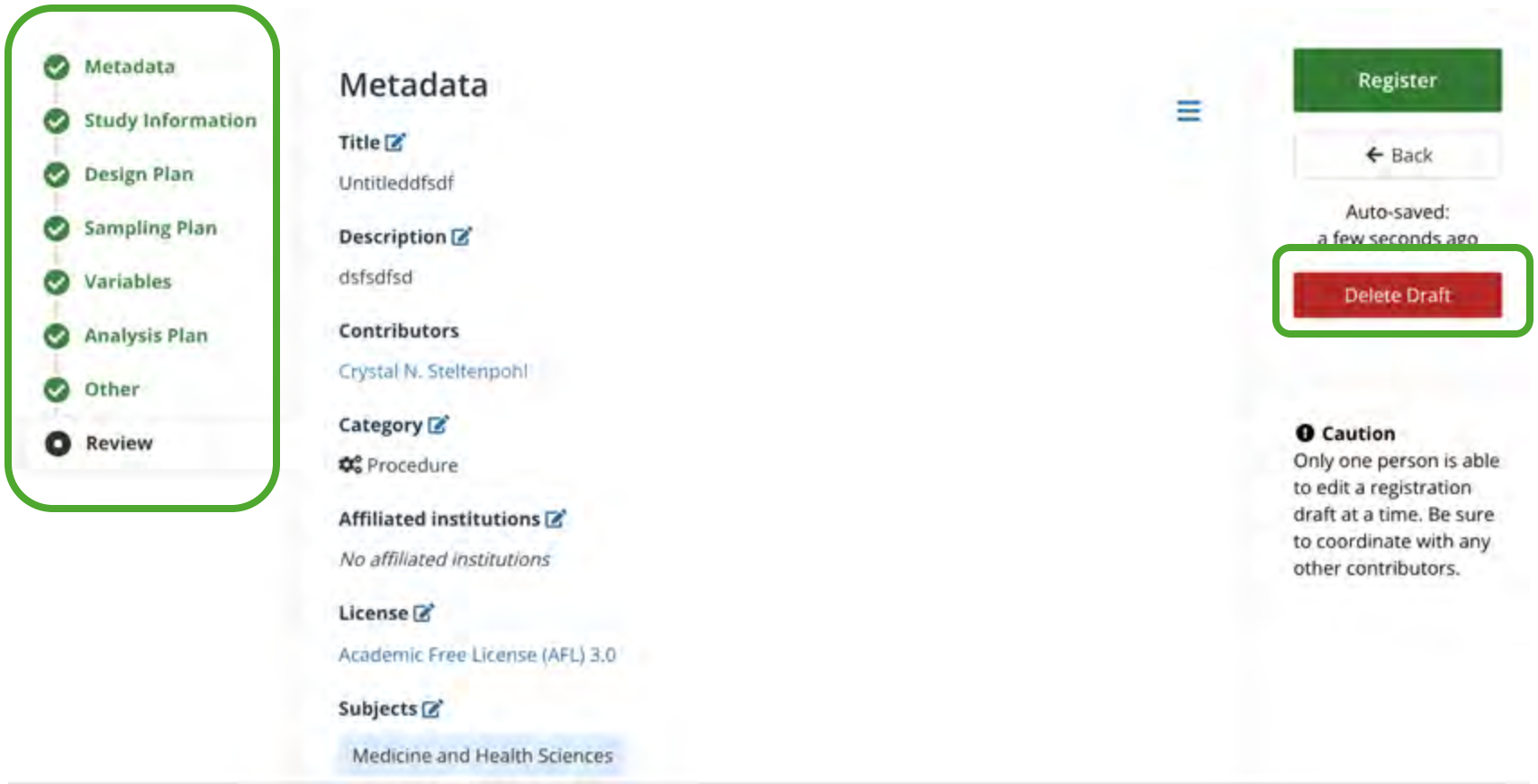

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Almost done…

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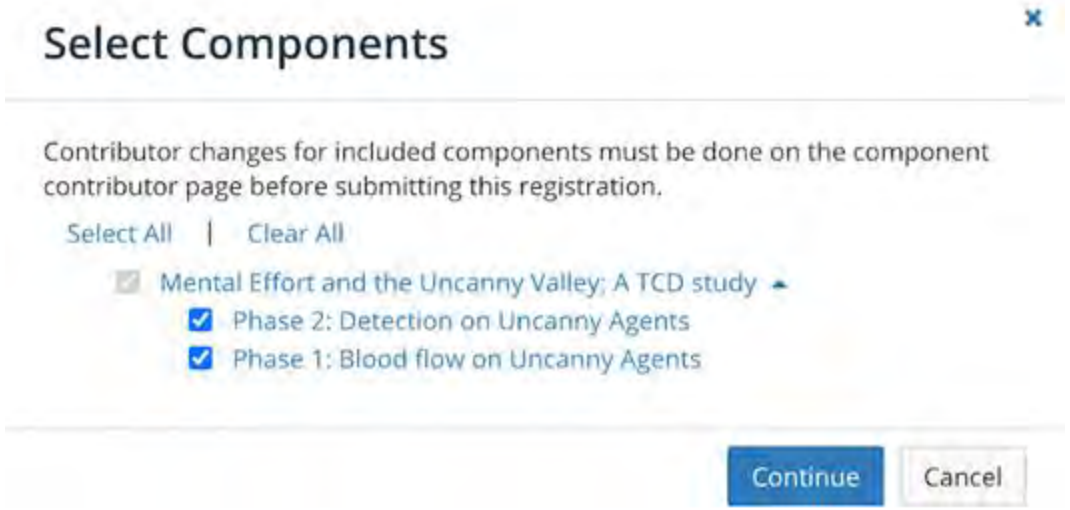

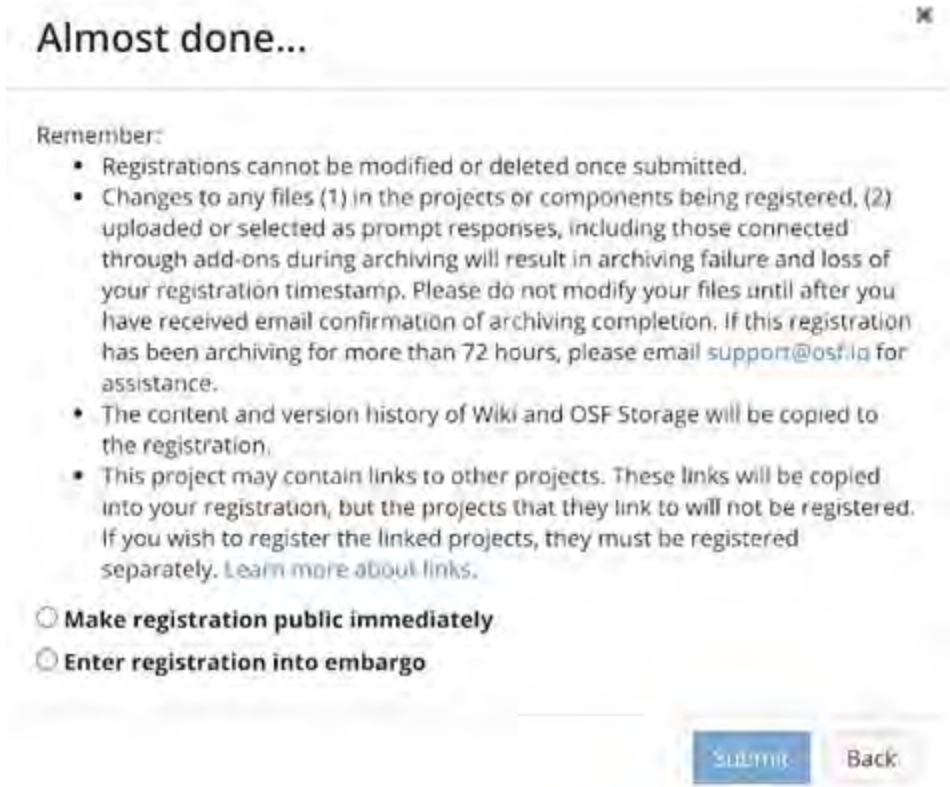

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Registration Pending

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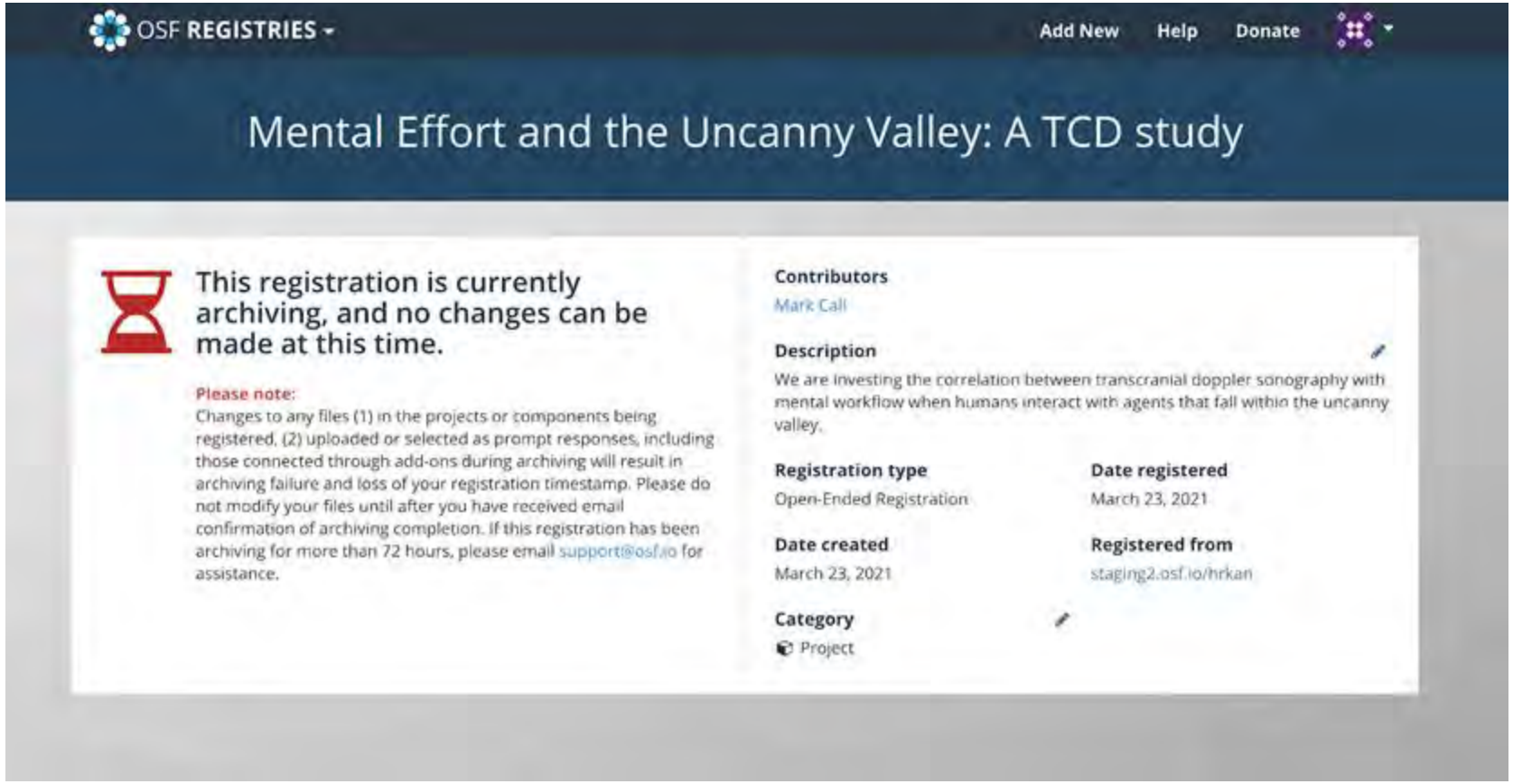

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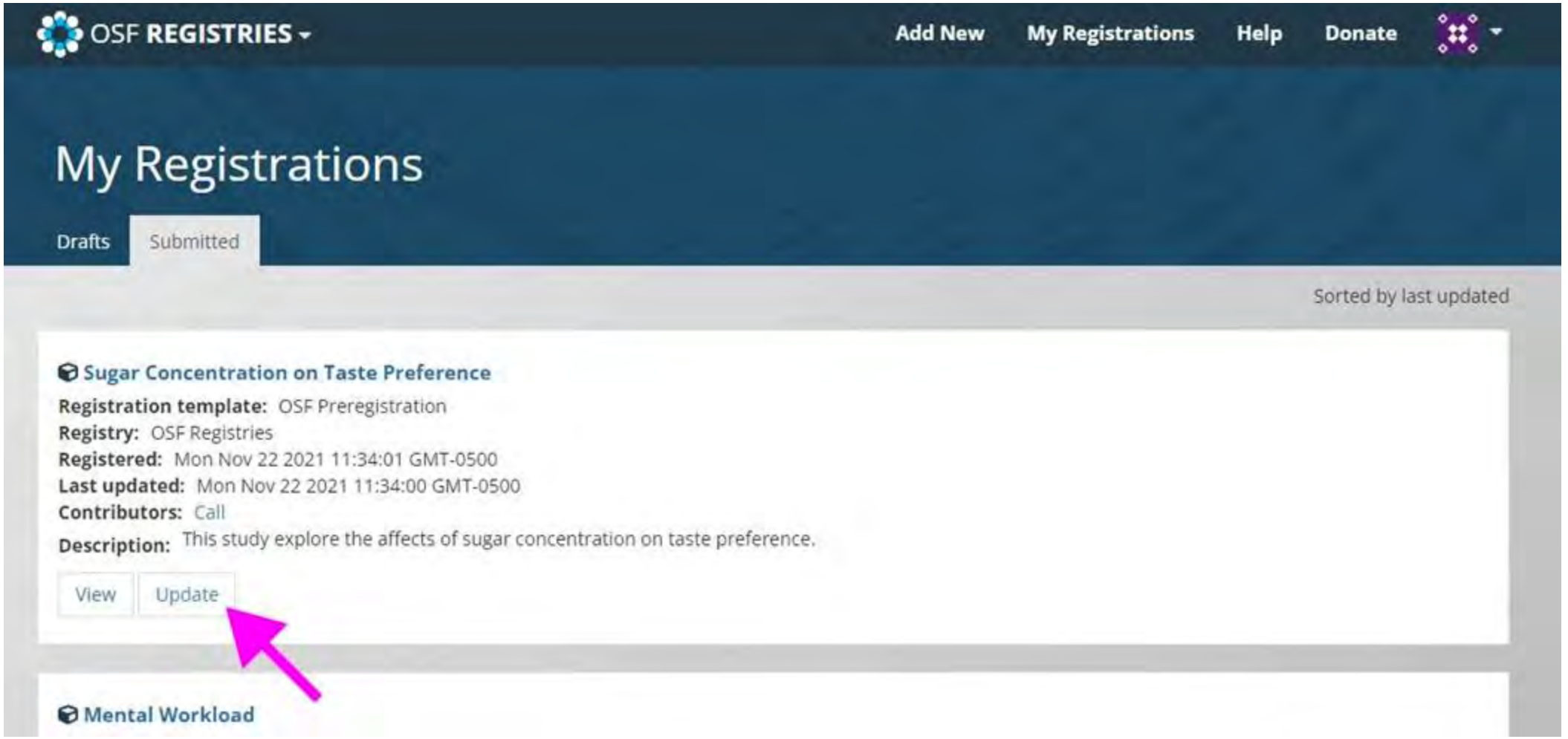
Updating preregistrations through the preregistration

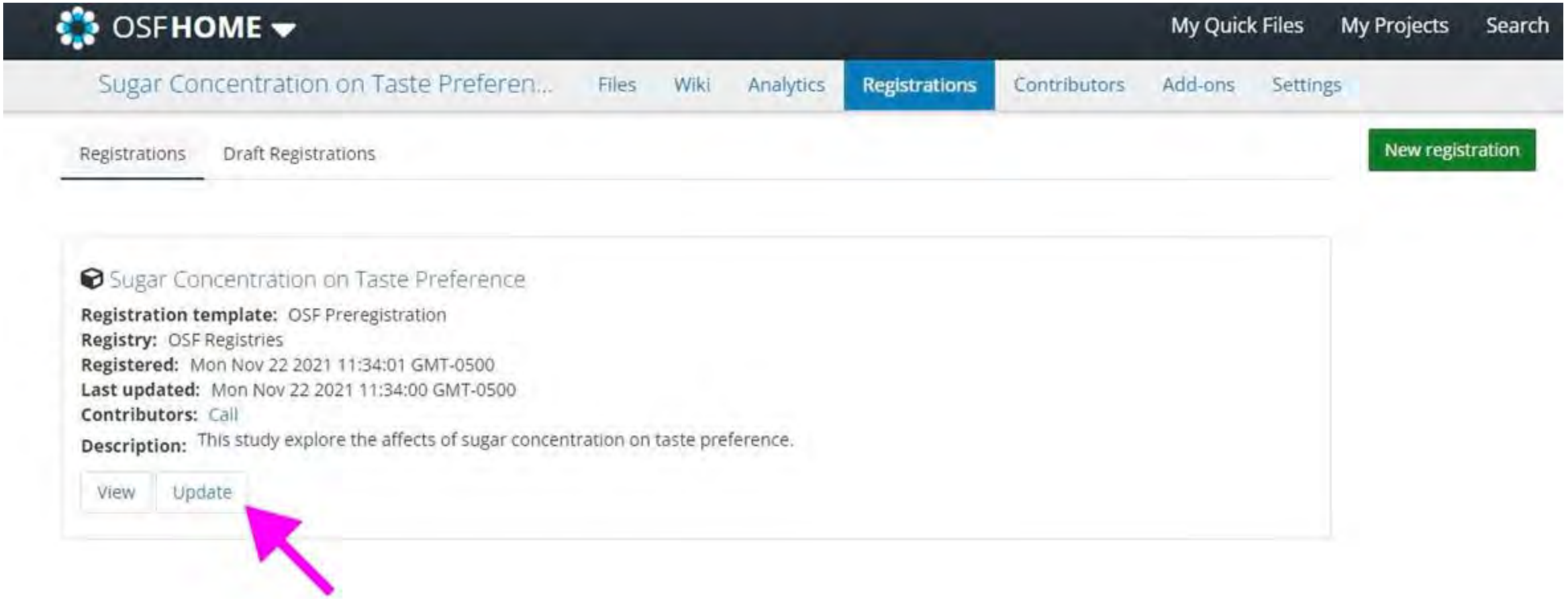
Remember that any changes must be accompanied by a justification.

Updating preregistrations through registrations list



Remember that any changes must be accompanied by a justification.

Updating preregistrations through OSF projects



Remember that any changes must be accompanied by a justification.

What if I need help?

Help Guides: https://help.osf.io

Email: support@osf.io

Thank you!

Research Practice Training

These are a series of short, self-paced online courses to help researchers at Oxford better understand the key principles of good research practice and find the resources and training you need to succeed in their research.

The courses are aimed at new researchers, and are general across all domains.

→ Please contact the Research Practice team with any questions at research.practice@admin.ox.ac.uk

Research Integrity & Governance

- Understand your responsibilities within the Oxford landscape

Open Research Practices

- Make your research as open as possible and as closed as necessary

Research Design

- Ensure your research is set for success with clear planning and design

Collaboration

- Build and develop safe and equitable collaborations in Oxford and beyond, associated with transparent recognition

Data

- Plan your research with your data needs in mind and think of future you!

Authorship, Publication & Peer Review

- Openly discuss contributions to research with collaborators and plan how to share your work with the research community

Research Impact & Public Engagement

- Ensure your research makes an impact and engage communities with it

Find out more:
https://www.ox.ac.uk/research/support-researchers/research-practice/research-practice-training

Resources: Why Preregistration

Avey, M. T., Moher, D., Sullivan, K. J., Fergusson, D., Griffin, G., Grimshaw, J. M., ... & Canadian Critical Care Translational Biology Group. (2016). The devil is in the details: incomplete reporting in preclinical animal research. *PLoS One, 11*(11), e0166733.

Gelman, A., & Loken, E. (2013). The garden of forking paths: Why multiple comparisons can be a problem, even when there is no “fishing expedition” or “p-hacking” and the research hypothesis was posited ahead of time. *Department of Statistics, Columbia University.*

Mertens, G., & Krypotos, A. M. (2022). Preregistration of studies with existing data. In *Integrity of Scientific Research: Fraud, Misconduct and Fake News in the Academic, Medical and Social Environment* (pp. 361-370). Cham: Springer International Publishing.

Nosek, B. A., Ebersole, C. R., DeHaven, A. C., & Mellor, D. T. (2018). The preregistration revolution. *Proceedings of the National Academy of Sciences, 115*(11), 2600-2606.

Resources: How to Do Preregistration

Krypotos, A. M., Klugkist, I., Mertens, G., & Engelhard, I. M. (2019). A step-by-step guide on preregistration and effective data sharing for psychopathology research. *Journal of Abnormal Psychology, 128*(6), 517.

Simmons, J. P., Nelson, L. D., & Simonsohn, U. (2021). Pre-registration: Why and how. *Journal of Consumer Psychology, 31*(1), 151-162.

Willroth, E. C., & Atherton, O. E. (2024). Best laid plans: A guide to reporting preregistration deviations. *Advances in Methods and Practices in Psychological Science, 7*(1), 25152459231213802.

Arpinon, T., Espinosa, R. A practical guide to Registered Reports for economists. J Econ Sci Assoc 9, 90–122 (2023). https://doi.org/10.1007/s40881-022-00123-1

Kirtley, O. J. (2022). Advancing credibility in longitudinal research by implementing open science practices: Opportunities, practical examples, and challenges. Infant and Child Development, 31(1), e2302.

Resources: Effects of Preregistration

Chan, A. W., Pello, A., Kitchen, J., Axentiev, A., Virtanen, J. I., Liu, A., & Hemminki, E. (2017). Association of trial registration with reporting of primary outcomes in protocols and publications. *JAMA, 318*(17), 1709-1711.

Dechartres, A., Ravaud, P., Atal, I., Riveros, C., & Boutron, I. (2016). Association between trial registration and treatment effect estimates: A meta-epidemiological study. *BMC Medicine, 14,* 1-9.

Scheel A. M., Schijen M. R. M. J., 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).

van den Akker, O. R., van Assen, M. A., Bakker, M., Elsherif, M., Wong, T. K., & Wicherts, J. M. (2023). Preregistration in practice: A comparison of preregistered and non-preregistered studies in psychology. *Behavior Research Methods,* 1-10.

Resources: Introductory Videos

Introduction: What are preregistration and registered reports?
https://www.youtube.com/watch?v=h0Pin-OUIS4

Testimonial video about researchers' experience with prereg/RRs:
https://www.youtube.com/watch?v=q4yf7Pt4q5c