

Hilmar Brohmer, Gabriela Hofer, Sarah von Götz

The State of Study Preregistration

How science benefits from it and
how to apply it¹

Open Science – Chance oder Herausforderung?, hg. v. Stadler und Klug, 2026, S. 55–77
https://doi.org/10.25364/978-3-903374-47-8_04

© 2026 bei Brohmer, Hofer, von Götz

Dieses Werk ist lizenziert unter einer Creative Commons Namensnennung 4.0 International Lizenz, ausgenommen von dieser Lizenz sind Abbildungen, Screenshots und Logos.

Hilmar Brohmer, Universität Graz, hilmar.brohmer@uni-graz.at, ORCID iD 0000-0001-7763-4229
Gabriela Hofer, Universität Graz, gabriela.hofer@uni-graz.at, ORCID iD 0000-0003-4407-1487
Sarah von Götz, Universität Graz, sarahvongoetz@googlemail.com, ORCID iD 0009-0006-9430-8867

1 This article is based on the talk “Vaccines against Biased Research: Preregistration and Registered Report” by Hilmar Brohmer, which took place at the Open Science Conference at the University of Graz on April 14, 2025.

Zusammenfassung

Studienpräregistrierung – ein dokumentierter Plan, wie eine zukünftige Studie durchgeführt werden soll – ist eine wichtige, jedoch oft unterbewertete Open-Science-Praktik. In diesem Artikel beschreiben wir die Entstehung von Präregistrierungen in der Medizin und Psychologie und erläutern, wie die Wissenschaft insgesamt von ihrer Nutzung profitieren kann. Wir zeigen außerdem, dass die Anwendung der Präregistrierung unter Forschenden in den Sozial- und Verhaltenswissenschaften bisher sehr langsam voranschreitet. Dafür ist womöglich eine Reihe von Vorbehalten und Missverständnissen mitverantwortlich, die wir in diesem Artikel diskutieren. Wir stellen eine kurze und leicht zugängliche Anleitung zu Präregistrierungen vor, die Forschenden dabei helfen und motivieren soll, Präregistrierungen in ihren Arbeitsablauf zu integrieren.

Schlagwörter: Präregistrierung, Registered Report, Open Science, Forschungsethik

Abstract

Study preregistration – a documented plan on how to conduct a future study – is an important, yet underappreciated Open Science practice. In this article, we describe the emergence of preregistration in medicine and psychology and how science as a whole may benefit from it. We also show that the uptake of preregistration is thus far very slow among researchers in the social and behavioral sciences. There may be several reservations and misconceptions for this, which we address in this article. We further provide a short and accessible tutorial on preregistration that may enable and motivate researchers to start using preregistration in their workflow.

Keywords: preregistration, registered report, Open Science, research ethics

Introduction

The concept of a study preregistration is simple and straight forward: It is a plan, usually committed in writing and documented in a publicly accessible digital form, describing why and how a study will be conducted and analyzed in the future. It is done before data is collected or analyzed and contains information on research questions and hypotheses, research design and planned data analysis (Parsons et al. 2022). With a preregistration a researcher thus provides a high level of transparency for the study in preparation. Although this seems like a trivial task – and even one that laypersons may believe to be common in science – preregistrations in a systematic and publicly available form have not been around for long.

In this article, we want to briefly review how and under which circumstances preregistration was introduced to research on human subjects, how several preregistration forms developed based on the original idea, and how effective preregistrations may tackle widespread problems of publication bias. Next, we will present how preregistration is adopted by researchers, particularly PhD students, in psychology – a field where preregistration has recently become more common – over time. Then, we will provide a tutorial on how to implement preregistration in one's research using the popular Open Science Framework repository (OSF). Finally, we will address some common critiques of preregistration. This article aims to give a brief overview on preregistration and to remove barriers researchers might have towards implementing them by providing a straight-forward tutorial on how to get started. Given that preregistration is applicable in their research, this may motivate them to integrate preregistration in their future studies.

Emergence of Preregistration

Although most researchers spend a lot of time working out the details on how to set up their scientific studies, the idea of a preregistered plan that lays out the specifics of a future study and that is publicly accessible is not older than a quarter century.

In medical research, preregistration was first implemented around the year 2000 in response to an emerging credibility crisis: many clinical studies probing new medications (usually conducted in randomized controlled trials) seemed to show positive effects (i.e., patients became healthy quickly following a new medication compared to placebo or an older medication). However, follow-up studies of the same medical treatments sometimes did not show the same health benefits – despite seemingly carefully conducted research. This called into question the results of the initial studies that largely reported positive findings and indicated a publication bias towards positive findings (Simes 1986; Easterbrook et al. 1991). As a response,

the US National Institute for Health launched the first registry for studies – ClinicalTrials.gov – where researchers had to indicate the aims and set-up of their planned studies. It was received positively and just five years later the International Committee of Medical Journal Editors of major scientific journals made registration of studies a mandatory requirement for later publication (McCray and Ide 2000; ClinicalTrials.gov 2025). The effectiveness of this early form of a preregistration became evident in 2010s: compared to before, new studies in medical research rarely reported exaggerated health benefits. Instead, findings became more nuanced and oftentimes even showed null effects (Kaplan and Irvin 2015). The public registration of the research plan resulted in fewer researchers trying to circumvent their initial idea to publish “positive” results that turned out to be fluke findings later.

The social and behavioral sciences had their own simmering credibility and replication crisis, which flared up in the early 2010s.² First, concerns arose that some findings in the social and cognitive-psychological domain seemed to be incompatible with physical understandings of the world or just absurd to be taken for granted (Lakens 2025). Most prominently, one paper in a prestigious psychology journal demonstrated that some people could “feel the future” by seemingly correctly guessing the position of erotic pictures on an empty computer screen. Not only did this finding cause some media controversy (French 2012), but also proved to be unreliable in a follow-up study (Ritchie et al. 2012).

More often than not did these findings show positive – statistically significant – effects that appeared to confirm the researchers’ hypotheses, implying that they are almost always right with their predictions. However, a group of methodologists convincingly argued that many findings could simply be fluke results stemming from undisclosed analyses steps. They are known as “researcher degrees of freedom”, where researchers flexibly conduct several analyses, but only report the one’s that culminate in a positive finding. When carefully conducting replication studies, these results would likely vanish (Simmons et al. 2011). Indeed, a large-scale replication project by the Open Science Collaboration (2015) demonstrated that of 100 published psychological studies from major journals, more than 60 % could not show the same result when the study was independently replicated – a major upset for researchers in the field.

2 Almost at the same time, but independently of this crisis, researchers in the fields of economics and political science started to use pre-analysis plans. In a similar spirit as preregistrations, pre-analysis plans also aim at specifying analysis steps beforehand to avoid false-positive results particularly in intervention studies (see McKenzie 2012; Humphreys et al. 2013; Olken 2015).

Simmons and colleagues (2011) argued that the issues of replicability and transparency need to be addressed far beyond researchers only sharing their data and methods, which constitute necessary, but not sufficient Open Science (OS) practices for more transparency. Instead, researchers would need to commit to and uphold important parts of their research idea beforehand to decrease the chance that they would later deviate too much from their initial plan through hindsight and confirmation bias in their analysis decisions. In other words, they needed to explicitly commit to which part of their research is confirmatory (hypotheses testing) and which part is exploratory (hypotheses generating; see also Nosek et al. 2018). Hence, the idea of preregistration started to spread in psychology.

Key points of a Preregistration

Simmons and colleagues (Data Colada 2015) as well as Nosek and his colleagues from the Center for Open Science (n. d.) became vanguards of preregistration by providing early online platforms – the Wharton Credibility Lab (<https://aspredicted.org/>) and the Open Science Framework (OSF, <https://osf.io/>) – and popularized the concept in psychology and other social and behavioral sciences. If one looks at their popular preregistration forms on these repositories (i. e., the popular “AsPredicted” form or the “OSF Preregistration” form), principles of what a preregistration should entail to be informative become evident (see also McPhetres 2020; Simmons et al. 2021). These principles can be roughly subsumed under the following key points of a preregistration:

- a) **Research question and hypotheses:** What question do the researchers want to answer and what specific prediction, if any, is being made for the confirmatory part?
- b) **Research design and variables:** How is the study conceptualized and set up and which variables are measured or experimentally manipulated?
- c) **Sample size justification:** What is the population and the sample size drawn from it? Is this sample size sufficient to find a hypothesized effect given that it exists? Is there a known/estimated effect size, which can be basis for a statistical power analysis?
- d) **Analysis plan and preparation steps:** How is the data being prepared to become ready for the analysis? Do these steps reduce the sample size through data exclusion? What are the specific assumptions and analysis strategies?

These points should be fixed beforehand to avoid hidden flexibility and questionable research practices when analyzing the data later, which quickly lead to false-positive results (Simmons et al., 2011). Note that these points resemble core specifications that have also been discussed in other publications (e. g., Wicherts et al. 2016; Hahn et al. 2025)

Development of Preregistration and Registered Reports

While the initial preregistration forms focused on experimental studies in psychology (see Bowman et al., 2016), several groups of Open Science proponents from different disciplines have since updated and refined the idea of study preregistration, making it suitable for several kinds of research, including qualitative studies (Haven and van Grootel 2019), replication studies (Brandt et al. 2014), systematic reviews (van den Akker et al. 2023), or secondary analyses of existing data (van den Akker et al. 2021). Moreover, in a collaborative effort of task forces of several psychological associations, a more comprehensive preregistration form was developed for the whole field of psychology (the “PRP-Quant” form, see Bosnjak et al., 2022).³

These efforts reflect that researchers increasingly recognized the non-replicability of findings not only as an issue of social and cognitive psychology (in which the replication crisis came to light), but as a fundamental issue to many scientific disciplines that apply some kind of hypothesis testing. More precisely, the issue concerns foremost disciplines that deduce ideas to be tested (ideally formulated in hypotheses) in future studies from theory and/or previous knowledge. The studies serve as a test to verify or falsify these ideas (Fidler et al. 2018; Scheel et al. 2020).⁴ Excessive positive results are present in research disciplines that apply hypothesis testing (see Fanelli 2010), and many of these deal with own replication issues (e. g., experimental economics, Camerer et al. 2016; social sciences, Camerer et al. 2018; and pre-clinical cancer research, Errington et al. 2021).

Several journals even brought the preregistration concept one step further: While preregistering a study before data collection provides a level of transparency, there

3 In this comprehensive form, researchers can provide highly detailed information on study specifics and data handling. Thus, it resembles an extended data management plan. The most recent version of the template (version 3) is available as a web application (<https://prereg-psych.org/create/>).

4 As a reviewer noted, we want to mention that this so called Hypothetico-Deductive Method does not apply to *all* scientific disciplines alike. For instance, in disciplines that uncover information about the past, such as history or archeology, hypothesis testing in a form similar to psychology is simply not applicable. Hence, preregistration in the way presented in this article cannot be applied to this research either. Nonetheless, other forms of a priori planning (e. g., for the later interpretation of findings) may also help researchers avoid traps of confirmation and hindsight bias.

is no formal review process in place. The journal format of *Registered Reports* (Chambers 2013; Chambers and Tzavella 2022) addresses this problem, which includes an a priori peer-review. This way, researchers write a journal-style preregistration and submit it to a journal before the begin of the data collection or data analysis. The peer-review then critiques the theory and methods (rather than the results) and can provide constructive feedback. This effectively allows the researchers to collect feedback at a timepoint where it can still be implemented in their study. A second round of peer-review for the final article (i. e., after data collection, analysis and writing) merely verifies that the researchers followed their initial preregistered plan. Registered Reports come with the premise that the research is evaluated based on its actual quality and contribution to the field, rather than on whether its results turn out to be positive. Thus, Registered Reports provide the means to prevent publication bias towards positive results (Chambers 2017). On the online platform “Peer-Community In Registered Reports” (<https://rr.peercommunityin.org>), the research community even aims at standardizing the peer-review process for Registered Reports, unifying it across all participating psychology journals.

Similar to medical research, preregistration in the social and behavioral sciences, proved to be effective: effect sizes in published studies that utilized preregistration are often much smaller than in regular studies (Schäfer and Schwarz 2019), implying that the literature is less swamped with fluke findings. This is particularly true for Registered Reports, which also seem to be of higher quality in terms of their theorizing, methods, and implications (Scheel et al. 2021; Soderberg et al. 2021).

Although registries like the OSF provide researchers with a highly streamlined and low-effort way of preregistering their studies, the question remains, how many researchers actually chose to apply it in their research.

Uptake of Preregistration

Contrary to randomized controlled studies in medicine, studies in the social and behavioral sciences do not include mandatory preregistration before data collection. However, OS communities and initiatives have emerged across universities to promote the voluntary uptake of OS practices – including preregistration. These initiatives often employ various approaches such as the organization of journal clubs and larger events, or giving workshops and courses. They seek to show researchers why OS practices matter for improving research in relevant hypothesis-testing disciplines, and to help them develop the skills needed to put these practices into action successfully (e. g., Orben 2019; Armeni et al. 2021; Brohmer et al. 2025 in this issue).

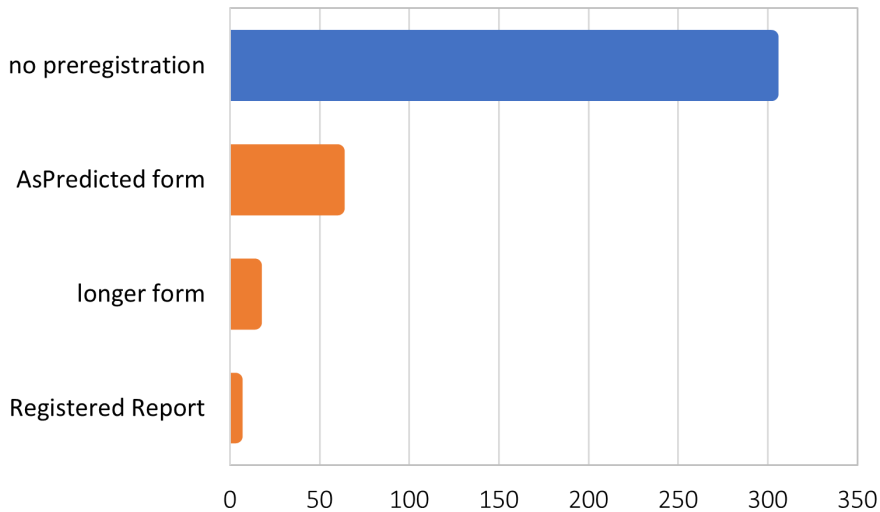


Figure 1: Use of preregistration in studies of psychology dissertations 2018–22.

Nonetheless, in the end, the success of such endeavors may be measured in how popular OS practices have become in research output, that is, in scientific publications. For preregistrations, an increase throughout the last decade may indicate that researchers started recognizing these practices being important to improve transparency in general. Some recent data from Hardwicke and colleagues (2024) suggests that there is indeed an uptake in applying preregistration: Whereas between 2016 to 2018, about 7 % of research articles in psychology reported a functional link to a preregistration form, this number had increased to 20 % in 2022. In major psychology journals, this rate could even be as high as 40 % (Pfadt et al. 2025; although the actual rate of completeness maybe lower, see Hahn et al., 2024).

Brohmer and Hoffmann (2025) did something similar, but focused on PhD students, because they are assumed to just having acquired their primary research skills, which they will likely use until the end of their career. In a sample of studies ($N = 379$) from 91 dissertations from psychology departments at two universities, they found that 20 % ($n = 80$) contained a preregistration, corroborating the results by Hardwicke. From all studies that used preregistration, most were based on the beginner-friendly “AsPredicted” form (16 %, $n = 60$), few used a longer and more com-

prehensive form like the “OSF Preregistration” (3.7 %, $n = 14$), and $n = 3$ (0.8 %) conducted a Registered Report (see Figure 1). Hence, early-career researchers started using preregistration, but there is certainly room for improvement.

If one looks at the prevalence of Registered Reports in journals, they do not appear to be very popular yet: we compared the proportion of Registered Reports in two journals from psychology: *Collabra: Psychology* emerged as a small journal dedicated to transparency and reproducibility throughout the last couple of years, whereas *Nature Human Behavior* quickly became a journal focusing on more broadly interesting and high-impact results. Both journals introduced Registered Reports in 2017. *Collabra*’s rate of Registered Reports went up from zero to 16 % in 2024 (14 out of 88 published research articles). For *Nature Human Behavior* the rate did not increase much: only about 1 % of published studies in 2024 were in a Registered Report format (two out of 153 published research articles).

Assuming that the types of submitted studies are otherwise similar, this may indicate two things: I) The few researchers, who aim at conducting a Registered Report may rather “play it safe” by submitting it to a journal (or the “Peer Community” platform, see above) that values transparency and reproducibility explicitly. A potential reason might be that they struggle with evaluating the importance and impact of their research before knowing their results.⁵ II) For a similar reason, the editors of high-impact journals may reject Registered Reports more often as they fear potential null findings (which are more common in Registered Reports), which they think are less citable.

Unfortunately, there is little data on the adoption of preregistration in research fields beyond psychology. A recent survey (Ferguson et al., 2023) among social scientists from sociology, economics and political science suggests that 10 to 25 % of researchers have used a preregistration before (although it was not specified for how many studies exactly). But as the awareness of the importance of OS practices only recently gained traction in fields like consumer research (Simmons et al. 2021), or education research (Krammer and Svecnik 2021, Reich 2021), a slow and delayed uptake of preregistration is rather plausible. With our following tutorial, we hope to stimulate a further uptake of preregistration across fields.

5 For researchers, who value OS a lot, another reason might be that the smaller, transparency-oriented journal is more in line with their values and that the open-access publication charges in that journal are not as high.

Four Easy Steps to Preregistration – A Brief Tutorial

Certainly, science would benefit from a quicker uptake of OS practices and particularly from the uptake of study preregistration. However, for individual researchers it can be difficult to know where to start as this methodological skill is rarely taught in university courses. Moreover, researchers at later career stages might have received their training before the emergence of preregistration. In this section, we will provide a four-step tutorial for preregistration in the hopes that this will make it easy for interested researchers to get started.

We have chosen the OSF, as this is a very accessible registry and researchers might already be familiar with it for other OS-related purposes (e. g., as a repository for data sharing). Moreover, it is compliant with the General Data Protection Regulation of the European Union and also allows working in private projects. The only prerequisite is that interested readers create an account on the OSF (<https://osf.io/>).

It is also important that readers already have a relatively concrete study idea in mind, including the research questions, hypotheses and methodology. The OSF provides many available preregistration templates, which differ in level of detail and type of research they can be applied to (see <https://help.osf.io/article/229-select-a-registration-template>). As this is a beginner's tutorial, we will focus on the "AsPredicted" format which is relatively short and can be applied to most experimental studies and beyond. The following four steps are illustrated in Figure 2.⁶

Step 1: Create a New Project

"Projects" on the OSF are superordinate folders, which can be created for single studies or whole research projects (e. g., a dissertation or a post-doc grant project). Upon clicking on the button "Create New Project" (Figure 4a), one should select a short, but clearly descriptive title (e. g., "Study 1: Cooperative Behavior"). When selecting a server, it is advisable to keep local data protection regulations in mind (e. g., European researchers may select the Frankfurt server).

Step 2: Navigate to the Preregistration Form

The landing project page is now created and should look like as in Figure 4b. Note that this project is "private", which means it is only visible to the authors themselves and will remain private until the authors chose to share the project (e. g., during the

6 A video tutorial in German language is provided on the Unitube portal of the University of Graz: <https://unitube.uni-graz.at/portal/aufzeichnungen.html?id=e1afd6a9-c7cf-4faa-a77d-4953c501c67f>

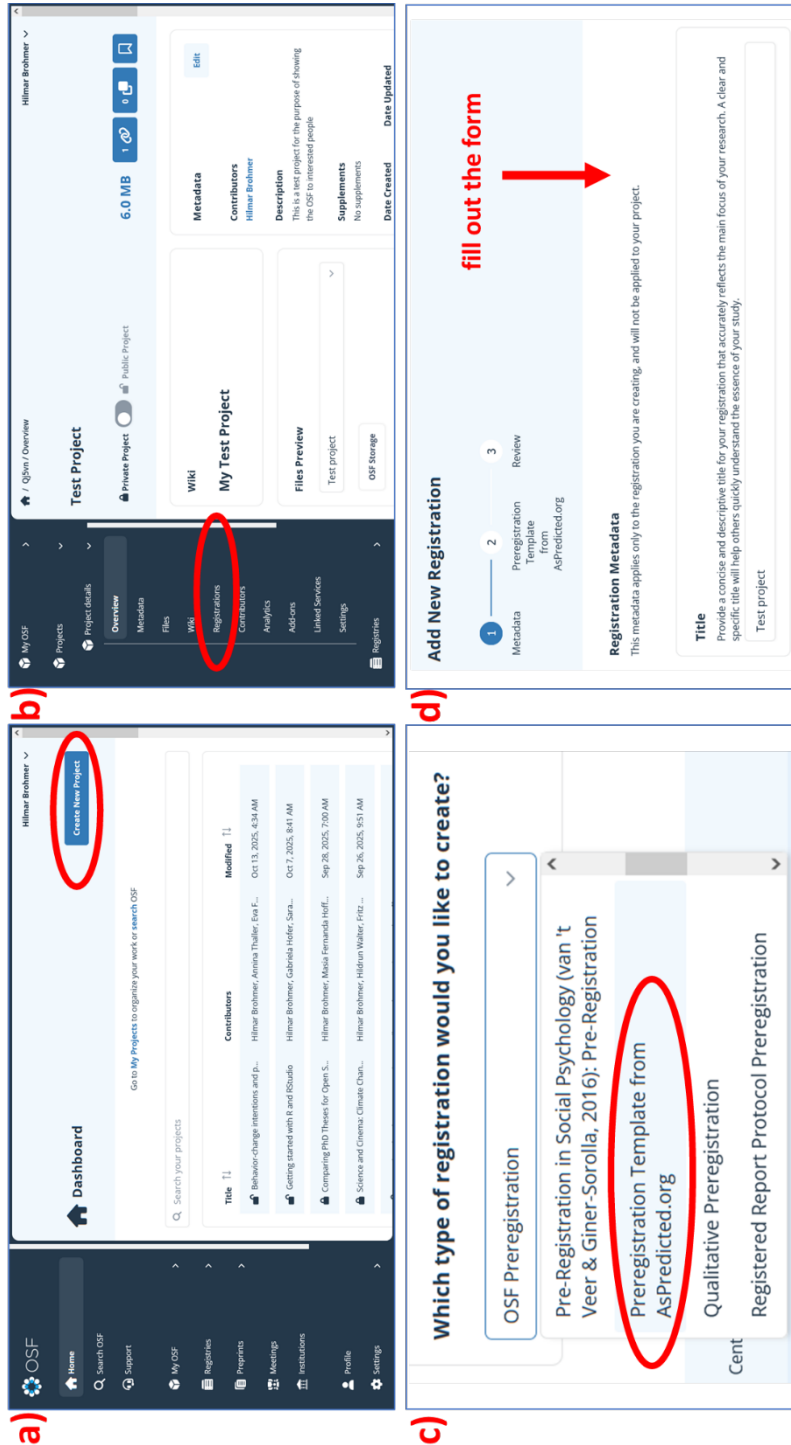


Figure 2: Four Steps to a Preregistration via the Open Science Framework

Note: red ellipses and arrows with annotation are added for clarification; form is available on <https://osf.io/>; screenshots were taken in October 2025

publication of the research paper). Following the tabs on the left, one could later add information on the project by clicking on the *Wiki* tab, add supplemental documents, methods, and data files via the *Files* tab, or add co-authors and collaborators to the project via the *Contributors* tab. For adding a preregistration, one should simply click on the *Registrations* tab and then on “add a registration”.

Step 3: Choose a Preregistration Form

On the next page, select that you have content for registration and an existing project (i.e., the one you just created). As we mentioned above, there are many preregistration forms available, but we select the “AsPredicted” form from the drop-down list (Figure 2c).⁷ Researchers with more preregistration experience may choose the “OSF Preregistration” form, which is more informative in regard to some details (see Bakker et al. 2020), or another form that closely aligns with their study design (e. g., Replication Recipe). Experienced researchers from psychology and related disciplines are further advised to try out the accessible app of the comprehensive “PRP-Quant” form (<https://prereg-psych.org/create/>). After selection, click on “create draft”.

Step 4: Fill Out the Form and Submit It

This final step requires some time, depending on the study’s complexity and how well thought-through all study aspects already are. For a simple study, where all methodological and analytical decisions have already been made, one may plan to invest about 20 to 30 minutes. But the more details one can add, the better for the purpose of the transparency. Following a short study description (see Figure 2d), one has to fill out eight more questions (or headings), which contain information on the above-mentioned four key points A to D. Here we describe these points for the “AsPredicted” form to provide researchers with some guidance:

1. *Title and Description.* Here, the purpose of the study should be contextualized and the research should be mentioned (e. g., online experiment via a survey platform). (Corresponds with key point b)
2. *Has the Data Collection Started?* Choose the appropriate option – usually it is “no”. If “yes” is chosen, elaborate in point 9 why you still believe that this study can be preregistered.

⁷ Even if the planned study at hand is not an experiment, but rather an observational / correlational study, one can customize the content to fit the purpose, as we describe below.

3. *Hypotheses*. For confirmatory studies, one should list all hypotheses, which will be tested in the study. Although the heading asks for hypotheses, one could also list further exploratory research questions. (Corresponds with key point a)
4. *Dependent Variable*. This is the variable (or variables) of interest that is measured to draw a conclusion from (i. e., the outcome variable on which two groups are compared). (Corresponds with key point b)
5. *Conditions*. In a simple experiment, this point constitutes the experimental and control group. It is beneficial to include some information what the treatment of the experimental group entails (e. g., a new medication). Also, one could add relevant control variables (e. g., participant gender). For correlational studies, one should add here any independent, predictor or moderation variable which is relevant for the study. (Corresponds with key point b)
6. *Analyses*. How is the data analyzed to draw conclusions from it and what is the inferential rule or criterium (e. g., the p-value of a test statistic)? Here, one should also add important pre-processing information, such as, how the dependent variable is transformed or how composite scores are calculated. (Corresponds with key point d)
7. *Outliers and Exclusion*. Sometimes, cases have to be excluded before data analysis (e. g., because of extreme values on the dependent variable, unmet inclusion criteria (e. g., related to a minimum or maximum age, language requirements, etc.), or doubts about data quality). These exclusion rules should be defined here. (Corresponds with key point d)
8. *Sample Size*. One should indicate an anticipated sample size that one aims to collect. It is advisable to also provide a sample size justification (e. g., via a statistical power analysis) and distinguish between collected (raw) sample size and analyzed sample size (e. g., when dropouts are expected or after exclusion, see point 7). (Corresponds with key point c)
9. *Other*. It could be that data on additional variables is collected or the study is part of a larger research project. Such specifics, including further exploratory analysis ideas, can be optionally indicated here.

Up until this point, the preregistration is still in “private” mode. Upon pressing the “submit” button, which officially registers the study, researchers can set an embargo to when the preregistration becomes visible and findable. This can be up to

four years in the future and gives researchers time to conduct their study and publish their findings. The link to the preregistration should then be made available as part of the final publication. This will make their study plan transparent in the context of the published study.⁸

Reservations Against Preregistrations

Finally, we want to address some frequently raised criticisms of preregistration that are commonly voiced and that we have encountered during our work at the OS initiatives (see Brohmer et al. 2025 in this issue). They are also not solely anecdotal, as suggested by a recent study (Spitzer and Mueller 2023) of approximately 300 researchers from psychology: it showed that a non-negligible minority feared negative consequences for their research regarding flexibility (18 %) and discouragement of data exploration (7 %). Hence, we think that there is some merit in demonstrating that the criticisms are often based on misconceptions of preregistrations and are rarely justified. Moreover, some of them are – in our view – fallacies that do not provide an actual argument against the use of preregistration.

Critique 1

“A preregistration does not permit additional analyses.”

No, a preregistration allows for additional analyses – but those should be clearly indicated as such. Typically, researchers indicate their confirmatory hypotheses and primary analyses in a preregistration. That way, the preregistration is guiding them later after data collection to clearly distinguish their confirmatory analyses (i. e., hypothesis testing) from their exploratory analyses (i. e., hypothesis generating) – things that often blur in regular research reporting. Sometimes, researchers even indicate in their preregistration that they do not have clear hypotheses at all and aim to conduct the whole study as an exploratory project.

8 Note that for the peer-review process, researchers can also provide an anonymized view-only link to their preregistration, as a peer review is usually double-blind. To achieve this, one can follow the information on this link (October 2025): <https://help.osf.io/article/113-advanced-actions-registrations>.

Critique 2

“I cannot make reasonable changes in my research design or analysis steps anymore, once I preregistered the study.”

Reasonable changes are permitted, but they need to be highlighted as such. It is not uncommon that an initial plan has to be changed along the way – researchers are also just human beings. Fortunately, there are guidelines on how to deal with different kinds of deviations in the case of preregistrations. For instance, if a preregistered analysis strategy turns out to be not suitable for the data at hand, or one finds a mistake in the preregistration early, it is possible to update the preregistration by describing the reasoning on the OSF itself (see <https://help.osf.io/article/110-introduction-to-updating>). Of course, it is possible that such issues only occur later in the process after the researchers have looked into the data. In that case, researchers can mitigate the risk of bias by documenting all changes that they make. These deviations need to be clearly reported – as a rule of thumb, it is better to overreport than to underreport (see Hardwicke and Wagenmakers 2023; Willroth and Atherton 2024). Lakens (2024) wrote a comprehensive guide on how this could look like in a publication to ensure transparency. Willroth and Atherton (2024) provide a spreadsheet that can readily be used in future publications to report deviations (e. g., as part of the supplemental materials) and the Leibniz Institute for Psychology also offers a guided online app for this purpose (apps.leibniz-psychology.org/prp-dev/).

Critique 3

“Preregistration is not applicable to my research; it is only applicable to experimental research (and only in medicine and psychology).”

As we noted above, there are research fields, where preregistration (as presented in this article) is really not applicable. However, in many other fields, which aim at testing theoretically deduced hypotheses, preregistration could be applied more often than it is currently the case. These fields often have a quantitative research tradition, such as medicine and psychology (where the idea originated from), sociology, political science, economics, environmental sciences, education sciences, anthropology, pharmacology, molecular sciences, computer sciences and others. As we described above under the key points, OS proponents have developed several preregistration forms, which are not restricted to experimental research (i. e., controlled studies with experimental and control group). For instance, social scientists, who analyze existing survey datasets could use the secondary analysis preregistration form; or computer scientists may use the simulation study template. Moreover,

the concept of preregistration has even been extended to qualitative research, despite facing some recent debate (see Chen and Li 2024; Souza-Neto and Moyle 2025). In sum, it may be worthwhile for researchers to take a look at available preregistration forms that may be applicable to their research before prematurely dismissing the idea of preregistration.

Critique 4

“A preregistration does not mean the research is better – but it can be abused for mere virtue signaling.”

Indeed, a preregistered study is not automatically of higher quality than a study that is not preregistered. However, a study that is preregistered does automatically have more transparency than one that is not. Hence, evaluating the former study in regard to quality control in research (e. g., as part of a peer review) would be much easier (or indeed possible in the first place) compared to the latter study (van den Akker et al. 2023). Moreover, preregistration should be seen as a tool for researchers, who are interested in making the planning phase of their research more transparent. Hence, it improves transparency, not necessarily validity – a nuanced but important distinction. Of course, as there is no formal review process mandatory for a preregistration (except for Registered Reports), there are potentially instances of researchers, who abuse the preregistration format by providing a superficial and uninformative description, just so that they can indicate that they preregistered the study for publication benefits (see also Hahn et al., 2024). We do not intend to ignore or obscure this existing problem of virtue signaling (see Vize et al. 2024 in response to Klonsky 2024). At the same time, we are convinced it does not apply to the vast majority of scientists, who would rather use preregistration to improve their research with more transparent, carefully thought through study plans. To assure that preregistration remains a tool for more transparency, rather than a means for virtue signaling, major journals in Psychology started to install basic quality checks for preregistrations (along other OS practices). As such measures for extended peer review become more common (e. g., Hardwicke and Vazire 2023), the risk of mere virtue signaling will likely be reduced in adopting journals.

Critique 5

“Preregistration allows for cheating.”

This criticism relates to the previous point, but is really an amalgam of the strawman and nirvana fallacy: Yes, a scientist with purely egoistic motives, who does not

back off from blatant lying, could abuse the concept of preregistration (e. g., by preparing several preregistrations for one study). This critique ignores however that this fictional scientist would likely cheat in other research-related contexts, too. We also consider blatant lying and cheating not something that the large majority of scientists likely does. Moreover, just because preregistration is *not a perfect tool* that solves all transparency-related problems all at once, it is still a *pragmatic tool* that reduces opportunities for hidden flexibility and questionable research practices (Simmons et al. 2011): as preregistrations are time-stamped and, following an embargo, also findable and accessible, the presence of preregistrations (and other OS practices) make it easier to uncover cases of fraud or questionable research practices that might have stayed undetected otherwise.

Critique 6

“Preregistration takes too much from my time and there are no benefits.”

Researchers work in a highly competitive environment, where they are often under pressure to “publish or perish”. Hence, it is not unreasonable to be thinking about the costs and benefits of preregistration or other OS practices. Doing a proper preregistration requires some *individual effort* and training indeed (Nosek et al. 2019). It does get easier one research project at the time, but it will pose a nontrivial challenge the first time. Because preregistration is *beneficial for science as a whole*, it is still worthwhile engaging with it as early as possible in one’s research career. Using a beginners-friends preregistration form (see example above) can reduce initial reservations and may increase the chance that one uses it again later. Why? Because there are also *some individual benefits*: In our experience, a well thought out preregistration helps to improve the overall structure of the preparation with clear hypotheses and a well thought-through research design. Also, since a lot of the methodology and analysis plan is specified before data collection, the time initially invested pays off later when writing up the methods (e. g., for an article). We also want to highlight the usefulness of Registered Reports: While a Registered Report may take longer in the beginning phase (i. e., the study may be ready to go, but one still awaits peer review), there is the benefit of a guaranteed publication if one sticks to the prespecified plan, even for null-results. Finally, it is also worth keeping in mind that as preregistration and other OS practices become more popular, they may find their way into research evaluation and may be advantageous when applying for later positions in academia (see e. g., Gärtner et al. 2024; Schönbrodt et al. 2025).

Conclusion

Preregistration has many potential benefits for science in terms of transparency, thereby complementing other OS practices that mostly aim for reproducibility (accessible data and code) and replicability (open methods and materials). Despite a moderate uptake of preregistration in the field of psychology in recent years, the large majority of psychological researchers still does not apply it in their research. Moreover, preregistration remains unknown in many other hypothesis-testing fields beyond psychology. This is likely due to a lack of awareness or knowledge of how and why to preregister studies. We hope that our overview on preregistration and the short tutorial may inspire researchers to apply it in their future research, contributing to the uptake of this relevant OS practice.

References

- Armeni, Kristijan, Loek Brinkman, Rirkard Carlsson, Anita Eerland, Rianne Fijten, Robin Fondberg, ... and Raul Zurita-Milla. 2021. "Towards Wide-Scale Adoption of Open Science Practices: The Role of Open Science Communities." *Science and Public Policy* 48 (5): 605–11. <https://doi.org/10.1093/scipol/scab039>.
- Bakker, Marjan, Coosje L. Veldkamp, Marcel A. van Assen, Elise A. Crompvoets, How H. Ong, Brian A. Nosek, ... and Jelte M. Wicherts. 2020. "Ensuring the Quality and Specificity of Preregistrations." *PLOS Biology* 18 (12): e3000937. <https://doi.org/10.1371/journal.pbio.3000937>.
- Bosnjak, Michael, Christian J. Fiebach, David Mellor, Stefanie Mueller, Daryl B. O'Connor, Frederick L. Oswald, and Rosmarie I. Sokol. 2022. "A Template for Preregistration of Quantitative Research in Psychology: Report of the Joint Psychological Societies Preregistration Task Force." *American Psychologist* 77 (4): 602–15. <https://doi.org/10.1037/amp0000879>.
- Bowman, Sara, Alexander C. DeHaven, Timothy M. Errington, Tom E. Hardwicke, David T. Mellor, Brian A. Nosek, and Courtney K. Soderberg. 2016. "OSF Prereg Template." *MetaArXiv*. https://osf.io/preprints/metaarxiv/epgjd_v1.
- Brandt, Mark J., Hans IJzerman, Ap Dijksterhuis, Frank J. Farach, Jason Geller, Roger Giner-Sorolla, ... and Anna van 't Veer. 2014. "The Replication Recipe: What Makes for a Convincing Replication?" *Journal of Experimental Social Psychology* 50: 217–24. <https://doi.org/10.1016/j.jesp.2013.10.005>.
- Brohmer, Hilmar, Katja Corcoran, Gabriela Hofer, Silvia E. Kober, Živa Korda, Hildrun Walter, and Sarah von Götz (2025). "Bringing Open Science to Researchers and Students. Perspectives From Three Initiatives at the University of Graz." In *Open Science – Chance oder Herausforderung?*, edited by Elisabeth Stadler and Helmut W. Klug. Graz University Library Publishing. https://doi.org/10.25364/978-3-903374-47-8_07.

- Brohmer, Hilmar, and Masia F. Hoffmann. 2025. The Struggle to Make Transparency Mainstream – Initial Evidence for a Slow Uptake of Open Science Practices in PhD Theses. *Royal Society Open Science*. https://doi.org/10.31234/osf.io/kq9zd_v1.
- Camerer, Colin F., Anna Dreber, Eskil Forsell, Tech-Hua Ho, Jürgen Huber, Magnus Johannesson, ... and Hang Wu. 2016. “Evaluating Replicability of Laboratory Experiments in Economics.” *Science* 351 (6280): 1433–36. <https://doi.org/10.1126/science.aaf0918>.
- Camerer, Colin F., Anna Dreber, Felix Holzmeister, Tech-Hua Ho, Jürgen Huber, Magnus Johannesson, ... and Hang Wu. 2018. “Evaluating the Replicability of Social Science Experiments in Nature and Science between 2010 and 2015.” *Nature Human Behaviour* 2 (9): 637–44. <https://doi.org/10.1038/s41562-018-0399-z>.
- Center for Open Science. n. d. *Future-proof your research*. Preregister your next study. <https://www.cos.io/initiatives/prereg>.
- Chambers, Christopher D. 2013. “Registered Reports: A New Publishing Initiative at Cortex.” *Cortex* 49 (3): 609–10. <https://doi.org/10.1016/j.cortex.2012.12.016>.
- Chambers, Christopher D. 2017. “A vaccine against bias.” *The British Psychological Society*. <https://www.bps.org.uk/psychologist/vaccine-against-bias>.
- Chambers, Christopher D. and Loukia Tzavella. 2022. “The past, present and future of Registered Reports.” *Nature human behaviour* 6 (1): 29–42. <https://doi.org/10.1038/s41562-021-01193-7>.
- Chen, Zengxiang, and Xiang Li. 2024. “Infusing Pre-Registration into Tourism Research.” *Tourism Management* 104: 104931. <https://doi.org/10.1016/j.tourman.2024.104931>.
- ClinicalTrials.gov. 2025. *Clinical Trial Reporting Requirements*. <https://clinicaltrials.gov/policy/reporting-requirements>.
- Data Colada. 2015. *AsPredicted: Pre-registration Made Easy*. Scientific blog post. <https://datacolada.org/44>.
- Easterbrook, Philippa J., Ramana Gopalan, Jesse A. Berlin, and D. R. Matthews. 1991. “Publication Bias in Clinical Research.” *The Lancet* 337 (8746): 867–72. [https://doi.org/10.1016/0140-6736\(91\)90201-Y](https://doi.org/10.1016/0140-6736(91)90201-Y).
- Errington, Timmothy M., Maya Mathur, Courtney K. Soderberg, Alexandria Denis, Nicole Perfito, Elisabeth Iorns, and Brian A. Nosek. 2021. “Investigating the replicability of pre-clinical cancer biology.” *elife* 10: e71601. <https://doi.org/10.7554/eLife.71601>.
- Fanelli, Daniele. (2010). “‘Positive’ results increase down the hierarchy of the sciences.” *PloS one* 5 (4): e10068. <https://doi.org/10.1371/journal.pone.0010068>.
- Ferguson, Joel, Rebecca Littman, Garret Christensen, Elisabeth L. Paluck, Nicholas Swanson, Zenan Wang, ... and John-Henry Pezzuto. 2023. “Survey of Open Science Practices and Attitudes in the Social Sciences.” *Nature Communications* 14 (1): 5401. <https://doi.org/10.1038/s41467-023-41111-1>.
- Fidler, Fiona, Felix Singleton Thorn, Ashley Barnett, Steven Kambouris, and Ariel Kruger. 2018. “The Epistemic Importance of Establishing the Absence of an Effect.” *Advances in Methods and Practices in Psychological Science* 1: 237–44. <https://doi.org/10.1177/2515245918770407>.

- French, Christopher. 2012. "Precognition studies and the curse of the failed replications." *The Guardian*, 15 Mar 2012. <https://www.theguardian.com/science/2012/mar/15/precognition-studies-curse-failed-replications>.
- Gärtner, Anne, Daniel Leising, and Felix D. Schönbrodt. 2024. „Towards responsible research assessment: How to reward research quality." *PLoS biology* 22 (2): e3002553. <https://doi.org/10.1371/journal.pbio.3002553>.
- Hahn, Lena, Andreas Glöckner, Mario Gollwitzer, Jens Hellmann, Jens Lange, Simon Schindler, and Kai Sassenberg. 2025. "A Cross-Sectional Study of the Completeness of Preregistrations by Psychological Authors from German-Speaking Institutions." *Advances in Methods and Practices in Psychological Science* 8 (3): 25152459251357568. <https://doi.org/10.1177/25152459251357568>.
- Hardwicke, Tom E., Robert T. Thibault, Beth Clarke, Nicholas Moodie, Sophia Crüwell, Sarah R. Schiavone, ... and Simine Vazire. 2024. "Prevalence of transparent research practices in psychology: A cross-sectional study of empirical articles published in 2022." *Advances in Methods and Practices in Psychological Science* 7 (4): 25152459241283477. <https://doi.org/10.1177/25152459241283477>.
- Hardwicke, Tom E., and Eric-Jan Wagenmakers. 2023. "Reducing Bias, Increasing Transparency and Calibrating Confidence with Preregistration." *Nature Human Behaviour* 7 (1): 15–26. <https://doi.org/10.1038/s41562-022-01497-2>.
- Hardwicke, Tom E., and Simine Vazire. 2024. "Transparency Is Now the Default at Psychological Science." *Psychological Science* 35 (7): 708–11. <https://doi.org/10.1177/09567976231221573>.
- Haven, T. L., and Van Grootel, D. L. 2019. "Preregistering qualitative research." *Accountability in research* 26 (3): 229–244. <https://doi.org/10.1080/08989621.2019.1580147>.
- Humphreys, Macartan, Raul Sanchez de la Sierra, and Peter van der Windt. 2013. "Fishing, Commitment, and Communication: A Proposal for Comprehensive Nonbinding Research Registration." *Political Analysis* 21 (1): 1–20. <https://doi.org/10.1093/pan/mps021>.
- Kaplan, Robert M., and Veronica L. Irvin. 2015. "Likelihood of null effects of large NHLBI clinical trials has increased over time." *PloS one* 10 (8): e0132382. <https://doi.org/10.1371/journal.pone.0132382>.
- Klonsky, E. D. 2025. "Campbell's Law Explains the Replication Crisis: Preregistration Badges Are History Repeating." *Assessment* 32 (2): 224–34. <https://doi.org/10.1177/10731911241253430>.
- Krammer, Georg, and Erich Svecnik. 2020. "Open Science als Beitrag zur Qualität in der Bildungsforschung." *Zeitschrift für Bildungsforschung* 10 (3): 263–78. <https://doi.org/10.1007/s35834-020-00286-z>.
- Lakens, Daniël. 2025. "Concerns about replicability across two crises in social psychology." *International Review of Social Psychology* 38 (1). <https://doi.org/10.5334/irsp.1036>.
- McCray, Alexa T., and Nicholas C. Ide. 2000. "Design and implementation of a national clinical trials registry." *Journal of the American Medical Informatics Association* 7 (3): 313–323. <https://doi.org/10.1136/jamia.2000.0070313>.

- McKenzie, David. 2012. "A Pre-Analysis Plan Checklist." *World Bank Blogs*, October 28, 2012. <https://blogs.worldbank.org/en/impactevaluations/a-pre-analysis-plan-checklist>.
- McPhetres, Jonathon. 2020. *What should a preregistration contain?* Retrieved from PsyArXiv. <https://doi.org/10.31234/osf.io/cj5mh>.
- Nosek, Brian A., Charles R. Ebersole, Alexander C. DeHaven, and David T. Mellor. 2018. "The preregistration revolution." *Proceedings of the National Academy of Sciences* 115 (11): 2600–2606. <https://doi.org/10.1073/pnas.1708274114>.
- Olken, Benjamin A. 2015. "Promises and Perils of Pre-Analysis Plans." *Journal of Economic Perspectives* 29 (3): 61–80. <https://doi.org/10.1257/jep.29.3.61>.
- Open Science Collaboration. 2015. "Estimating the reproducibility of psychological science." *Science* 349 (6251): aac4716. <https://doi.org/10.1126/science.aac4716>.
- Orben, Amy. 2019. "A journal club to fix science". *Nature* 573 (7775): 465–466. <https://doi.org/10.1038/d41586-019-02842-8>.
- Parsons, Sam, Flávio Azevedo, Mahmoud M. Elsherif, Samuel Guay, Owen N. Shahim, Gisela H. Govaart, ... and Balazs Aczel. 2022. "A Community-Sourced Glossary of Open Scholarship Terms." *Nature Human Behaviour* 6 (3): 312–18. <https://doi.org/10.1038/s41562-021-01269-4>.
- Pfadt, Julius M., František Bartoš, Henrik R. Godmann, Meike Waaijers, Laura Groot, Ihnwhi Heo, ... and Eric-Jan Wagenmakers. 2025. "A Methodological Metamorphosis: The Rapid Rise of Bayesian Inference and Open Science Practices in Psychology". *PsyArXiv*. https://doi.org/10.31234/osf.io/ck3js_v1.
- Reich, Justin. 2021. "Preregistration and Registered Reports." *Educational Psychologist* 56 (2): 101–9. <https://doi.org/10.1080/00461520.2021.1900851>.
- Ritchie, Stuart J., Richard Wiseman, and Christopher C. French. 2012. "Failing the future: Three unsuccessful attempts to replicate Bem's 'Retroactive Facilitation of Recall' Effect." *PloS one* 7 (3): e33423. <https://doi.org/10.1371/journal.pone.0033423>.
- Schäfer, Thomas, and Marcus A. Schwarz. 2019. "The meaningfulness of effect sizes in psychological research: Differences between sub-disciplines and the impact of potential biases." *Frontiers in psychology* 10: 813. <https://doi.org/10.3389/fpsyg.2019.00813>.
- Scheel, Anne M., Mitchell R. M. J. Schijen, and Daniël Lakens. 2021. "An excess of positive results: Comparing the standard psychology literature with registered reports." *Advances in Methods and Practices in Psychological Science* 4 (2): 25152459211007467. <https://doi.org/10.1177/25152459211007467>.
- Scheel, Anne M., Leonid Tiokhin, Peder M. Isager, and Daniël Lakens. 2020. "Why Hypothesis Testers Should Spend Less Time Testing Hypotheses." *Perspectives on Psychological Science* 16 (4): 744–55. <https://doi.org/10.1177/1745691620966795>.
- Schönbrodt, Felix D., Anne Gärtner, Maximilian Frank, Mario Gollwitzer, Malika Ihle, Dorothee Mischkowski, ... and Daniel Leising. 2025. *Responsible Research Assessment I: Implementing DORA and CoARA for hiring and promotion in psychology*. https://doi.org/10.31234/osf.io/rgh5b_v2.

- Simes, Robert J. 1986. "Publication Bias: The Case for an International Registry of Clinical Trials." *Journal of Clinical Oncology* 4 (10): 1529–41. <https://doi.org/10.1200/jco.1986.4.10.1529>.
- Simmons, Joseph P., Leif D. Nelson, and Uri Simonsohn. 2011. "False-positive psychology: Undisclosed flexibility in data collection and analysis allows presenting anything as significant." *Psychological Science* 22 (11): 1359–1366. <https://doi.org/10.1177/0956797611417632>.
- Simmons, Joseph P., Leif D. Nelson, and Uri Simonsohn. 2021. "Pre-registration: Why and how." *Journal of Consumer Psychology* 31 (1): 151–62. <https://doi.org/10.1002/jcpy.1208>.
- Soderberg, Courtney K., Timmothy M. Errington, Sarah R. Schiavone, Julia Bottesini, Felix S. Thorn, Simine Vazire, ... and Brian A. Nosek, B. A. 2021. "Initial evidence of research quality of registered reports compared with the standard publishing model." *Nature Human Behaviour* 5 (8): 990–997. <https://doi.org/10.1038/s41562-021-01142-4>.
- Souza-Neto, Valério, and Brent Moyle. 2025. "Preregistration Is Not a Panacea, but Why? A Rejoinder to 'Infusing Preregistration into Tourism Research'." *Tourism Management* 107: 105061. <https://doi.org/10.1016/j.tourman.2024.105061>.
- Spitzer, Lisa, and Stefanie Mueller. 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>.
- van den Akker, Olmo R., Sara Weston, Lorne Campbell, Bill Chopic, Rodica Damian, Pamela Davis-Kean, ... and Marjan Bakker. 2021. "Preregistration of secondary data analysis: A template and tutorial." *Meta-Psychology* 5: 1–19. <https://doi.org/10.15626/MP.2020.2625>.
- van den Akker, Olmo R., Gjalte-Jorn Y. Peters, Caitlin J. Bakker, Richard Carlsson, Nicholas A. Coles, N. A., Katherine S. Corker, ... and Nicole Pfeiffer. 2023. "Increasing the transparency of systematic reviews: presenting a generalized registration form." *Systematic Reviews* 12 (1): 170. <https://doi.org/10.1186/s13643-023-02281-7>.
- van den Akker, Olmo R., Marcel A. L. M. van Assen, Manon Enting, Myrthe de Jonge, How H. Ong, Franziska Rüffer, ... and Marjan Bakker. 2023. "Selective hypothesis reporting in psychology: Comparing preregistrations and corresponding publications." *Advances in Methods and Practices in Psychological Science* 6 (3): 25152459231187988. <https://doi.org/10.1177/25152459231187988>.
- Vize, Colin E., Nathaniel L. Phillips, Joshua D. Miller, and Donald R. Lynam. 2025. "On the Use and Misuses of Preregistration: A Reply to Klonsky (2024)." *Assessment* 32 (2): 235–43. <https://doi.org/10.1177/10731911241275256>.
- Wicherts, Jelte M., Coosje L. S. Veldkamp, Hilde E. M. Augusteijn, Marjan Bakker, Robbie C. M. van Aert, and Marcel A. L. M. van Assen. 2016. "Degrees of Freedom in Planning, Running, Analyzing, and Reporting Psychological Studies: A Checklist to Avoid p-Hacking." *Frontiers in Psychology* 7: 1832. <https://doi.org/10.3389/fpsyg.2016.01832>.
- Willroth, Emily C., and Olivia E. Atherton. 2024. "Best Laid Plans: A Guide to Reporting Pre-registration Deviations." *Advances in Methods and Practices in Psychological Science* 7 (1): 25152459231213802. <https://doi.org/10.1177/25152459231213802>.

Short biographies

Hilmar Brohmer studied social and behavioral sciences in Germany, Norway and the Netherlands. He completed his PhD in Graz between 2016 and 2020 in social psychology. He is a founding member of GOSI, part of AOSAN, and is doing research on Open Science.

Gabriela Hofer completed her PhD in Graz between 2018 and 2022 at the Differential Psychology section. She is a founding member of GOSI and part of AOSAN. In her research she investigates interindividual differences in the perception of the self and others.

Sarah von Götz studied psychology in Graz between 2017 and 2023. Afterwards, she served as a research assistant at the Cognitive Science Section, where she dealt with the public perception of health information and became a core member of GOSI in 2024.