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Pre-registration in social psychology—A discussion and suggested template

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HIGHLIGHTS

- We suggest elements for pre-registration in social psychology.
- We offer initial guidelines to facilitate the process of pre-registration.
- We provide a brief history of pre-registration in medicine and psychology.
- Two models of pre-registration are outlined: reviewed and unreviewed pre-registration.
- Benefits and drawbacks of both models are discussed.

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ABSTRACT

Pre-registration of studies before they are conducted has recently become more feasible for researchers, and is encouraged by an increasing number of journals. However, because the practice of pre-registration is relatively new to psychological science, specific guidelines for the content of registrations are still in a formative stage. After giving a brief history of pre-registration in medical and psychological research, we outline two different models that can be applied—reviewed and unreviewed pre-registration—and discuss the advantages of each model to science as a whole and to the individual scientist, as well as some of their drawbacks and limitations. Finally, we present and justify a proposed standard template that can facilitate pre-registration. Researchers can use the template before and during the editorial process to meet article requirements and enhance the robustness of their scholarly efforts.

1. Introduction

In pre-registration, researchers describe their hypotheses, methods, and analyses before a piece of research is conducted, in a way that can be externally verified. Recently, a growing interest in transparency, reproducibility, and reducing publication bias has led scientists and journals to become more interested in the pre-registration of research. At the same time, pre-registration has been greatly facilitated by online tools that allow for public timestamping of plans and confirmatory predictions. This process can benefit both scientists and science; for example, when a researcher describes ahead of time which of several possible data analyses will be used, the resulting inferential statistics become more clearly interpretable, and the credibility of the claim increases. In this paper we discuss the advantages and disadvantages of pre-registration. We arrive at some initial suggestions for how our own field of experimental social psychology, and other related areas, can implement this practice, and we differentiate two pre-registration models—*reviewed* and *unreviewed*—for doing so. Finally, we propose a flexible template for pre-registrations in social psychological research, for the benefit of creators as well as evaluators of pre-registered research.

Many aspects of pre-registration are still being worked out. To understand how and why research pre-registration has evolved, it is useful to know its general history. This history has mostly taken place in medical research.

2. Pre-registration in medical research

Pre-registration began, not as a check on the outcomes of research, but rather to help the research get done in the first place. Starting in the 1960's, limited registries of clinical trials in medicine were made available in several countries, to help recruit patients with the appropriate diagnosis (Dickerson & Rennie, 2003). Requirements to disclose the

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results of the eventual study were few. However, from the 1980s onward, investigations showed evidence of publication bias. That is, trials that yielded significant rather than nonsignificant (or "null") results were substantially more likely to be published at all (Easterbrook, Berlin, Gopalan & Matthews, 1991; Simes, 1986) or in a timely manner (Ioannidis, 1998; Stern & Simes, 1997). Demonstrations of publication bias in specific medical literatures (e.g., Melander, Ahlqvist-Rastad, Meijer & Beermann, 2003; Turner, Matthews, Linardatos, Tell & Rosenthal, 2008), and of low replication rates of published medical research in registered clinical trials (e.g., Begley & Ellis, 2012; Mullane & Williams, 2013; Prinz, Schlange & Asadullah, 2011), led to calls for greater openness in registration.

The development of the Internet has allowed governmental and professional bodies to create accessible, centralized clinical trial registries. However, official oversight of their relation to scientific reporting did not begin until the mid-2000s. For example, in 2007, a new law in the United States required submission of results of trials involving FDA-approved treatments (Food and Drug Administration Amendments Act of 2007), and the World Medical Association's Declaration of Helsinki (2008) supported the principle that all results, regardless of outcome, should be made available. Efforts to improve the openness of registries have continued; the latest European regulation (Clinical trials-Regulation EU No 536/2014) requires reporting of results for all registered trials, as does a rule proposed recently in the US (Clinical Trials Registration and Results Submission, 2014). These recent developments seem to contribute to less selective reporting of medical research; preliminary evidence shows that the percentage of positive published results in one area of research dropped from 57% to 8% concurrent with the requirement to pre-register at clinicaltrials.gov (Kaplan & Irvin, 2015). However, a recent project comparing the specifics of pre-registered clinical trials in medicine to their published versions has found most articles to still contain some form of "outcome switching," or failure to fully report the pre-specified analytic plan (Mahtani, February 5, 2016).

3. Pre-registration in psychological research

As in medical research, some psychologists and neuroscientists propose more pre-registration to resolve worries about the representativeness of research reports in the published literature (e.g., Wagenmakers, Wetzels, Borsboom, van der Maas, & Kievit, 2012). An open letter to the Guardian newspaper in June 2013 signed by 80 academics in psychology and neuroscience called for journals to adopt pre-registration as an option (Chambers & Munafò, 2013). Reflecting this development, psychology and neuroscience journals have recently shown increased willingness to adopt "registered reports" as a submission category (e.g., Cortex, Perspectives on Psychological Science), to designate a special issue for articles featuring pre-registered research (e.g., Journal of Experimental Social Psychology, Social Psychology), to implement a system of badges designating pre-registered research (see Eich, 2014; "Badges to Acknowledge Open Practices," 2013), or, even more boldly, to dedicate a new journal in social psychology to such research (i.e., Comprehensive Results in Social Psychology, see "Challenging traditions in research reporting," 2014; Jonas & Cesario, 2015). Online platforms for pre-registration include the Open Science Framework (OSF), which has recently offered a thousand prizes of $1000 each to research teams in a pre-registration challenge (https://cos.io/prereg/), and the AsPredicted platform (https://aspredicted.org/). Additionally, pre-registration has been a requirement for most of the organized replication initiatives in psychology (e.g., Open Science Collaboration, 2012; Klein et al., 2014).

4. Two models of pre-registration and their uses

Two types of pre-registration are beginning to be used in psychology and related fields. The first type requires that studies undergo peer review on the basis of their theoretical grounds and methods before data are collected. We refer to this model as *reviewed pre-registration* (RPR), which has also been called a "Registered Report" (Chambers, Feredoes, Muthukumaraswamy, & Etchells, 2014; Nosek & Lakens, 2014). This type of research is conducted with the expectation that, if the plan is carefully followed, the report will be published regardless of the outcome. By approving the registration, the peer review process grants *In Principle Acceptance* (IPA). During submission of the pre-registration, reviewers' suggested amendments to the planned study can still be incorporated before the study is run. Ideally, cooperation occurs between reviewers and researchers, to ensure that the most suited method for the research question is used. This type of pre-registration has been adopted, for example, by *Cortex* and *Comprehensive Results in Social Psychology* (for a continually updated list of journals see https://osf.io/8mpji/wiki/home/).

The second type of pre-registration, which we refer to as *unreviewed pre-registration* (UPR), does not involve reviewers before the data is collected. Authors write out and time-stamp their full plan before conducting the study in order to be able to refer back to it later. This self-registration allows authors to conduct research more or less as usual. Unreviewed pre-registration thus leads to a review process very similar to the standard model, but with the reassurance that the authors' reports of method and analytic procedures have been specified *a priori*.

We recognize that research papers can incorporate multiple forms of registration and non-registration. Some recent journal editorials, for example, have expressed a willingness to encourage authors to follow up non-registered findings that fall short of robustness with a registered replication (Giner-Sorolla, 2016; Vazire, 2015; see also Bostyn & Roets, 2016 for an example of a paper combining unregistered and registered studies). Authors themselves can take the initiative to follow up unregistered exploratory research with registered confirmatory research following either model. It is also possible to start with an unreviewed pre-registered study and extend the research with a reviewed registration, so that an initial proof of concept is followed by an extension that benefits from peer review and in principle acceptance. Therefore, these two models should not be seen as mutually exclusive. Rather, each contributes to different priorities in the research cycle.

5. Benefits to science

Can these developments benefit our science on the whole? Although any definitive conclusion on the basis of a few years' experience is premature, some positive outcomes can reasonably be expected.

5.1. Prioritizing theory and method

First of all, pre-registering studies puts emphasis on developing sound theory and methods—the very elements specified in the pre-registration—rather than on results. Positively valuing strong theory and methods, rather than merely accepting results that meet a certain standard of statistical consistency, has been suggested as a way for the field of psychology to become more confident in both positive and negative results when conducting and publishing research (LeBel & Peters, 2011; Murayama, Pekrun & Fiedler, 2013). We further suggest that re-emphasizing theory and methods, and moving away from the superficial appearance of results as the main criterion for judging research, is a common thread that runs through all other benefits that pre-registration holds for our science. For example, it is not enough simply to point to a series of significant study results at $p < .05$, without considering the full space of analytic decisions that were possible within the studies' theoretical constraints (Wasserstein & Lazar, in press), and pre-registration makes this full space more transparent.

From this viewpoint, pre-registration is particularly useful for studies that fall within a certain range on a spectrum of theoretical specification. At one extreme of this spectrum, we see studies that test