Why Debates about Preregistration are Debates about Philosophy of Science

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Study registries exist to reveal the existence of studies, published or not, to investigators and systematic reviewers.

Null results are a lot more frequent in **Registered Reports**

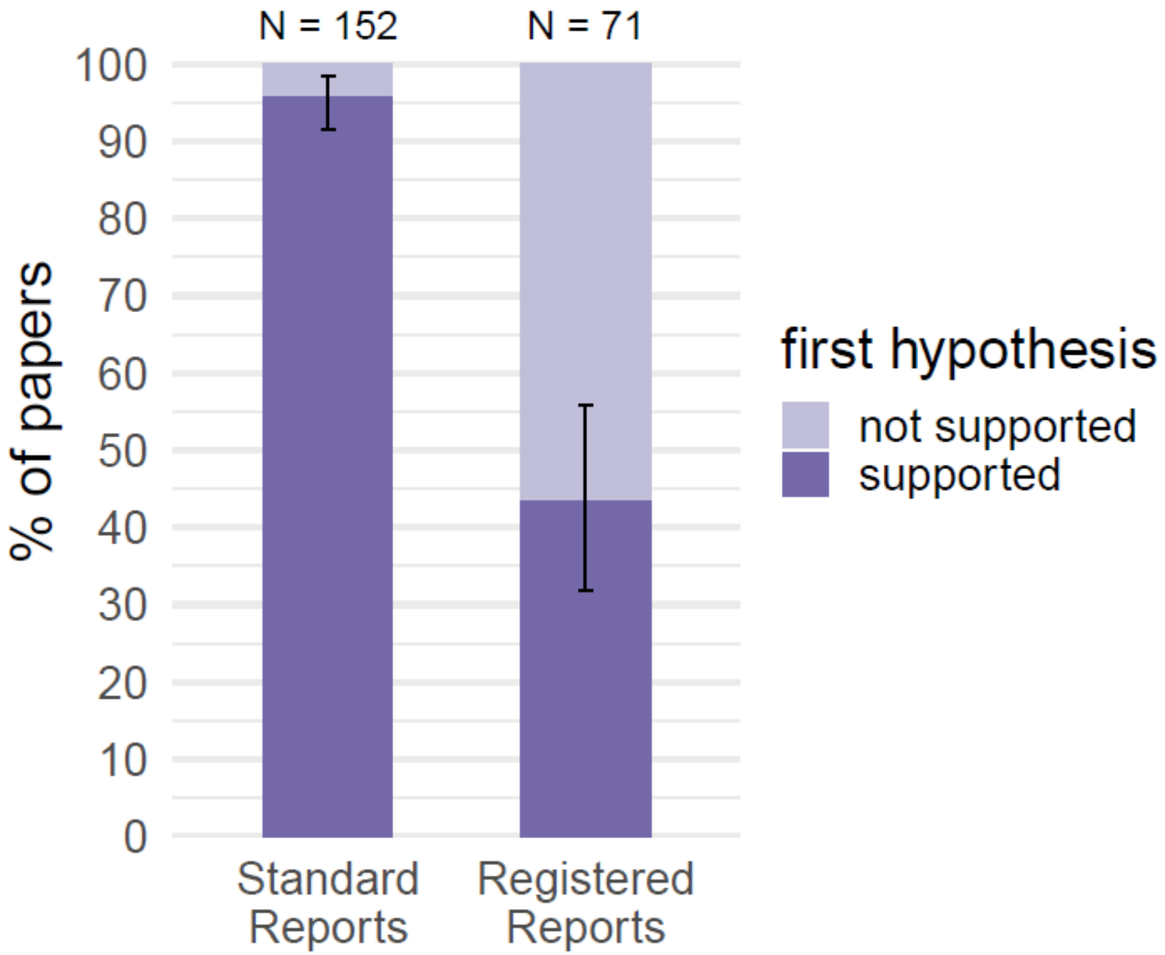
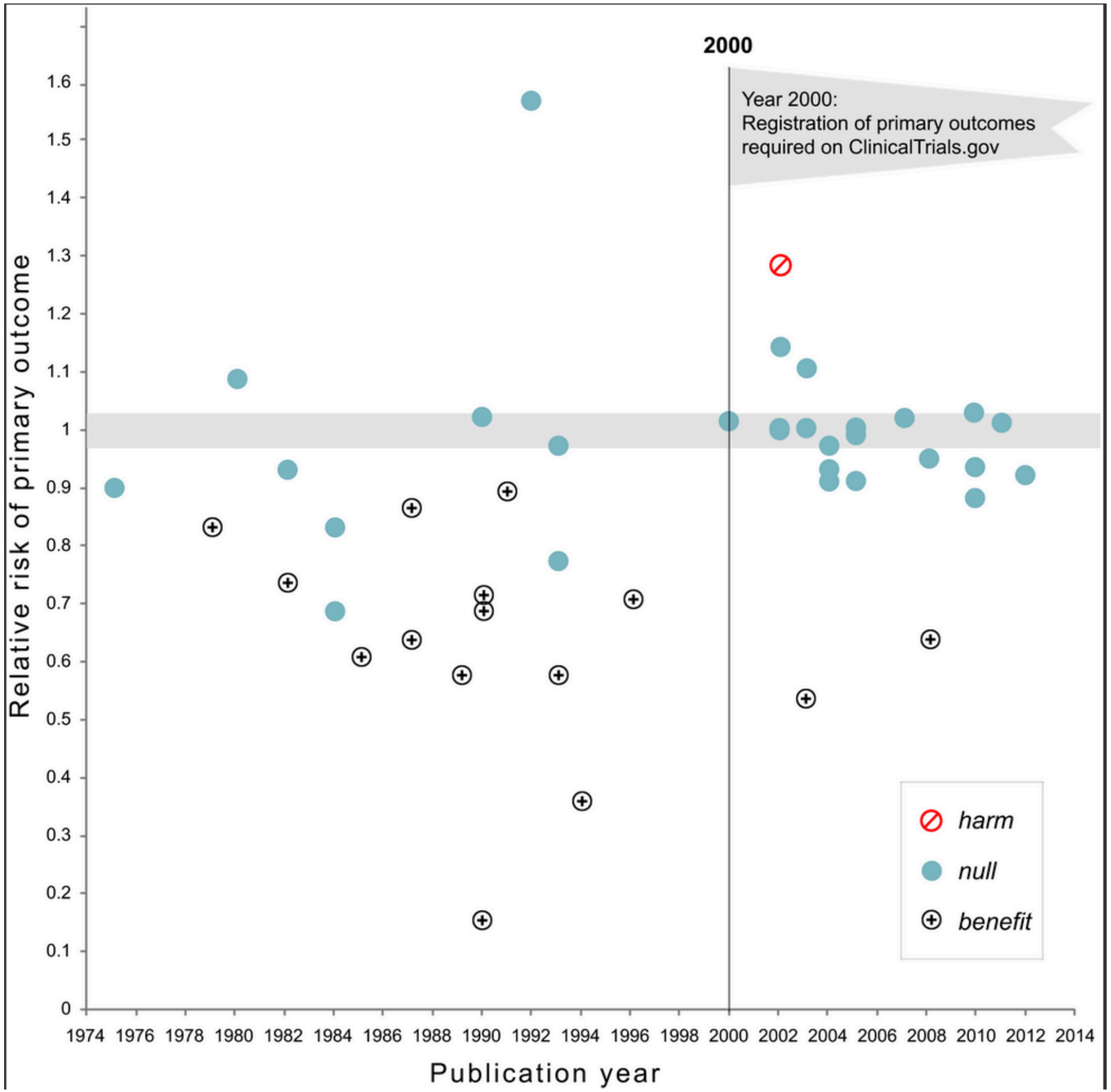


Figure 2. Positive result rates for standard reports and Registered Reports. Error bars indicate 95% confidence intervals around the observed positive result rate.

[Scheel, Scheijen, Lakens, 2021]

Study registries can require a **preregistered** sampling and analysis plan.



Before 2000 17/30 large national Heart Lung and Blood Institute funded clinical trials showed a significant (+) effect. After pre-registration, only 2/25 showed a significant effect.

Kaplan & Irvin, 2015

Whenever an investigation is partly designed for hypothesis testing and partly of an exploratory nature — which is a not infrequent occurrence (cp. 4;2;3) — a strict differentiation should be maintained between these two elements. In particular, this applies to the publication of results. It is a serious offense against the social ethics of science to pass off an exploration as a genuine testing procedure. Unfortunately, this can be done quite easily by making it appear as if the hypotheses had already been formulated before the investigation started. Such misleading practices strike at the roots of 'open' communication among scientists.

De Groot, 1969

Registered Reports do not prevent or discourage exploratory analysis. Rather, they make clear the distinction between confirmatory and exploratory analysis. This applies to registered reports whether they are conducted for replications or original research. Confirmatory results follow a preregistered analysis plan and thereby ensure interpretability of the reported *p*-values (Wagenmakers et al., 2012). In exploratory analysis, *p*-values lose their meaning due to an unknown inflation of the alpha-level. That does not mean that exploratory analysis is not valuable; it is just more tentative.

Nosek & Lakens, 2014

So initially, preregistration was presented purely as an approach to make it possible to ‘audit’ a *p*-value, and check if it they did not lose their “error probing capacity” (Mayo, 2018).

However, researchers also too loosely write that preregistered studies are always more compelling:

"This is particularly important if one wants to convince a skeptical audience of a controversial claim: After all, **confirmatory studies are much more compelling than exploratory studies**."

Wagenmakers, Wetzels, Borsboom, van der Maas, 2012

Taken together, these practices *[reducing p-hacking and publication bias, and power analysis]* will ensure that articles published as *Registered Reports* have a **substantially higher truth value** than regular studies. Such articles can therefore be expected to be more replicable and have a greater impact on the field.

Chambers, NeuroChambers blog, 2012

Preregistration clarifies the distinction between planned and unplanned research by reducing unnoticed flexibility. **This improves credibility of findings** and calibration of uncertainty.

Nosek, Beck, Campbell, Flake, Hardwicke, Mellor, van ‘t Veer, Vazire, 2019

In practice, confirmatory tests might be **much more compelling**, have **improved credibility of findings**, and **higher truth value.**

They might also not.

The goal of preregistration is to allow others to evaluate the severity of a test.

This evaluation might lead them to be more impressed by the finding, or not.

Preregistration is an example of learning by doing – but we need to think about the basic principles that justify preregistration.

Discussing preregistration without discussing philosophy of science is a waste of time.

Preregistration adds value for people who, based on their philosophy of science, increase their trust in claims that are supported by severe tests and predictive successes.

Lakens, 2019

As far as I am aware, Mayo's severity argument from an error-statistical philosophy provides the only coherent framework for the value of preregistration.

Mayo, 1996; 2018

Thank you

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