

To help inform the special education research community, these briefs feature information on prominent open science practices. Content comes from our series of short articles in the DR newsletter, *Focus on Research*, as well as additional content developed by DR members.

## PREREGISTRATION FOR RESEARCH

Open science is an umbrella terms that refers to practices aiming to make all stages of science more open and transparent. Although some have argued that open science can make research more trustworthy, impactful, and efficient in special education (Cook et al., 2018), there is a lack of clarity in the field about what open-science practices are, their primary benefits and potential obstacles, and how to access resources for implementing them. In this brief, we discuss **preregistration**.

### Why Preregister?

Undisclosed researcher flexibility when conducting and reporting studies is an important source of potential bias in research (see Simmons et al., 2012). For example, researchers may “p-hack” (i.e., experiment with different statistical models and analyses until a p-value of less than .05 is attained), selectively report study outcomes (e.g., omit analyses for those that were not statistically significant), or HARK (hypothesize after results are known), but report the study as if the reported hypotheses and

analyses were the only ones planned or conducted. Such questionable research practices appear to be common, and are virtually impossible to detect in traditional publications (see Makel et al., 2019). Preregistration is one approach for making some questionable research practices more easily detected, thereby discouraging researchers from engaging in them and increasing the validity of research findings (Nosek et al., 2018).

### What is Preregistration?

Preregistration involves publicly reporting the research questions, planned methods, and data analysis plans before conducting a study. Typically, preregistration is accomplished by posting study plans on a freely accessible, online registry such as the [Open Science Framework](#) or the [Registry of Efficacy and Effectiveness Studies \(REES\)](#). Preregistrations at these and other registries are timestamped, assigned a digital object identifier (doi), and easily discovered in online searches. Posting research questions and plans for sampling, variables, data analysis, and other methodological details before the study begins provides researchers with a clear blueprint for conducting and reporting study findings. Importantly,



it also allows editors, reviewers, and other research consumers to compare and identify discrepancies between research plans and research reports (Johnson & Cook, 2019; Nosek et al., 2018; Nosek et al., 2019). For example, if a researcher collected data on three outcome variables, but only reported findings for the two on which participants showed significant improvement, this could be identified by examining the preregistration.

Additionally, preregistration may help combat publication bias (i.e., the file-drawer problem) by making studies that are not published (e.g., studies with null findings) easily discoverable. Although preregistration is most commonly used with group research, it can be applied in single-case and qualitative research, as well as for systematic literature reviews and meta-analysis.

## Plans Can Change

Preregistration should be thought of as a plan that can be amended as needed, rather than as a prison that prohibits flexibility and exploration (DeHaven, 2017). Change in education research is likely the rule rather than exception, and researchers frequently must adjust study samples, outcome variables, and interventions as they negotiate the realities of working in and with schools. Such changes are not antithetical to preregistration. Preregistrations can and should be updated as changes in a study occur, with a brief explanation of the change.

Preregistration just provides a transparent record of those changes. Similarly, preregistration does not prohibit or discourage exploratory analyses. Researchers can and should conduct analyses beyond those that are preregistered.



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Preregistration simply provides a clear delineation between a priori hypotheses-testing (i.e., confirmatory) analyses and non-preregistered exploratory analyses (Nosek et al., 2018; Nosek et al., 2019).

## Investing in Preregistration Pays Dividends

Preregistration demands a change in workflow for most researchers, in that detailed planning of study methods and analyses occurs and must be written up



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before a study is conducted. Despite this greater time commitment before the study begins, preregistration can improve and streamline the subsequent conduct, analysis, and write up of the study. Although we are not aware of any research in education, preregistration has been associated with markedly smaller effects in other fields (e.g., Kaplan & Irvin, 2015). For example, Schafer and Schwartz (2019) reported a median  $r$  of 0.16 for preregistered studies in psychology, compared to 0.36 for non-preregistered studies.

The actual process of preregistering study plans on a repository is not difficult. There are many registries for researchers to choose from, which typically provide step-by-step directions for completing the process. REES, for example, provides a series of prompts for researchers to follow; and has a specific process for preregistering single-case design studies. Alternatively, the Open Science Framework provides multiple templates for researchers to choose from when preregistering studies. Some journals (e.g., *Exceptional Children*) have begun to recognize and reinforce preregistration by awarding electronic badges to article reporting studies that were preregistered. Although preregistering studies will involve a change in workflow and possibly additional work for most researchers, it enhances the transparency and trustworthiness of the research process.

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