Pre-registration in Single-case Design

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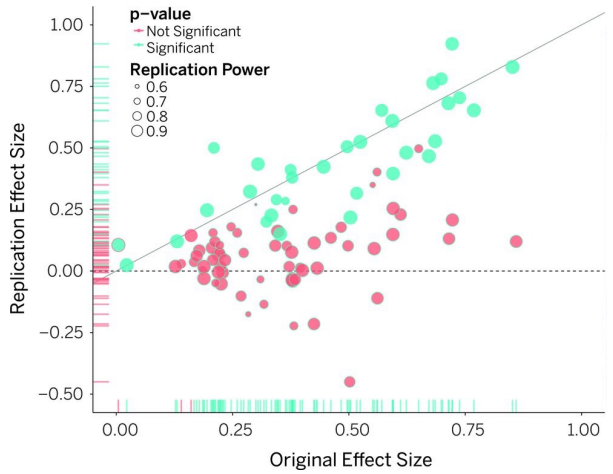
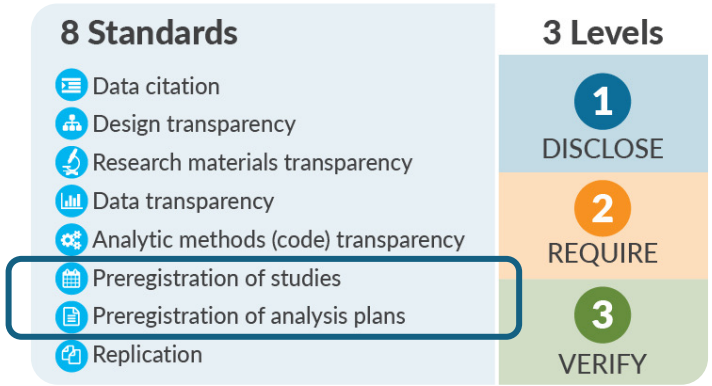
Presentation Materials

Brief Context for Preregistration Practices





"Replication Crisis" in Social/Medical/Bx. Research

- Concerns that published research has a high risk of replication failure (e.g., weak, inconsistent effects)

- Issues with reporting and determination of study outcomes contributing to inflated/inaccurate representation of findings

Transparency and Openness Promotion (TOP)

- Open science practices emerged as one approach for addressing sources of bias in the research process

- **Transparent** and **Open** practices are emphasized as behavior incompatible with questionable researcher practices

- Preregistration is included as a strategy for transparently communicating **planned research strategies**

Nosek, B. A., Alter, G., Banks, G. C., Borsboom, D., Bowman, S., Breckler, S., ... & DeHaven, A. C. (2016). Transparency and openness promotion (TOP) guidelines.

Preregistration: Researcher Behavior Change

Added Steps in the General Research Process

- Registration **before** conducting planned research

- Plans are timestamped, but can be amended over time (e.g., study plans change, study completed)

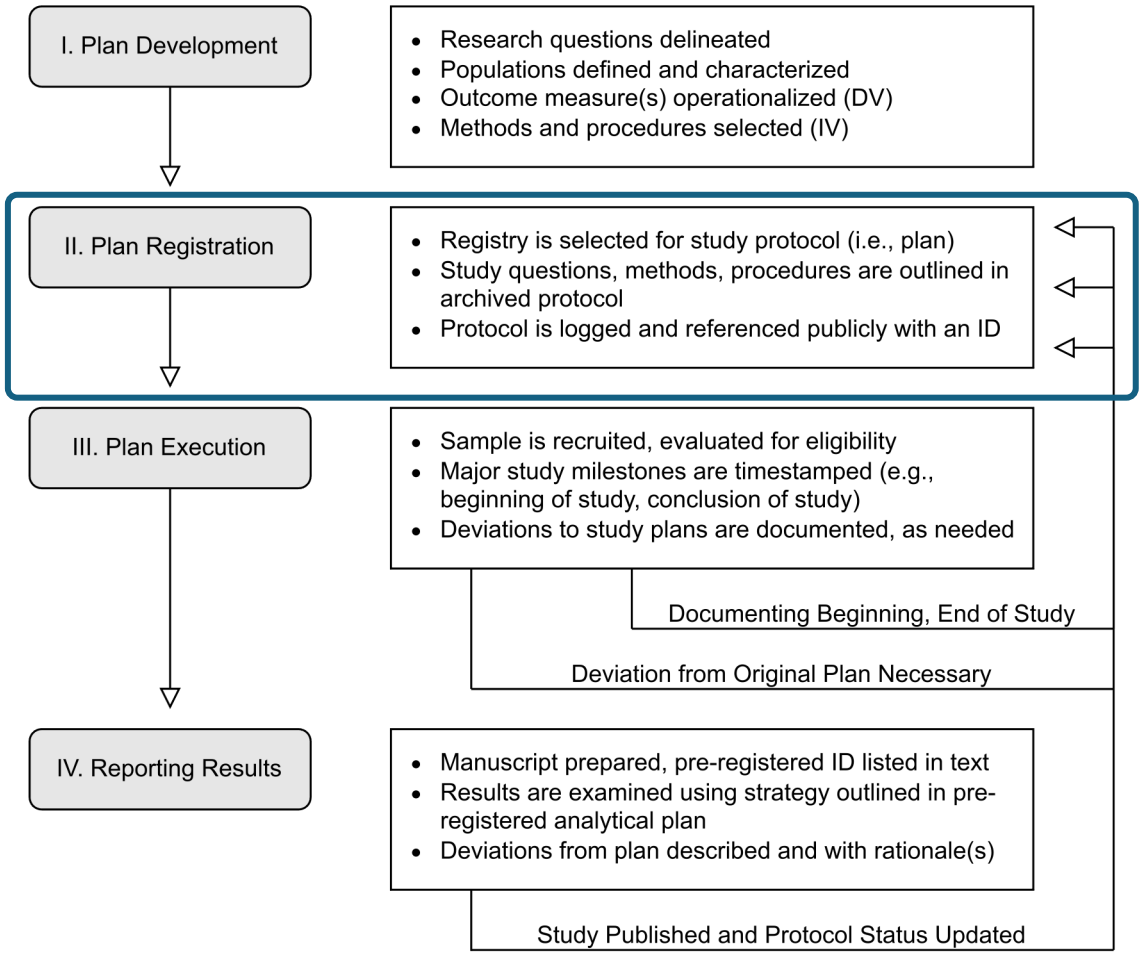
- Protocols can be viewed by others in the repository

Information Featured in Study Protocols

- Primary **questions/aims**, **measures**

- Strategies for **recruitment** (e.g., approach, sizes)

- Strategies for **data analysis** (e.g., tests)



Note: The act of submitting protocol is often easiest following the initial IRB Approval process, and updated thereafter (e.g., study completed, published)

Benefits to Existing Research Processes

Addressing Selective and Incomplete Reporting

- Full range of measures/outcomes are specified in an initial study protocol

- Original research aims/questions retained in the original study protocol

Limiting *Certain* Researcher Degrees of Freedom

- Pre-establishing practices for handling data (e.g., who/what data is dropped)

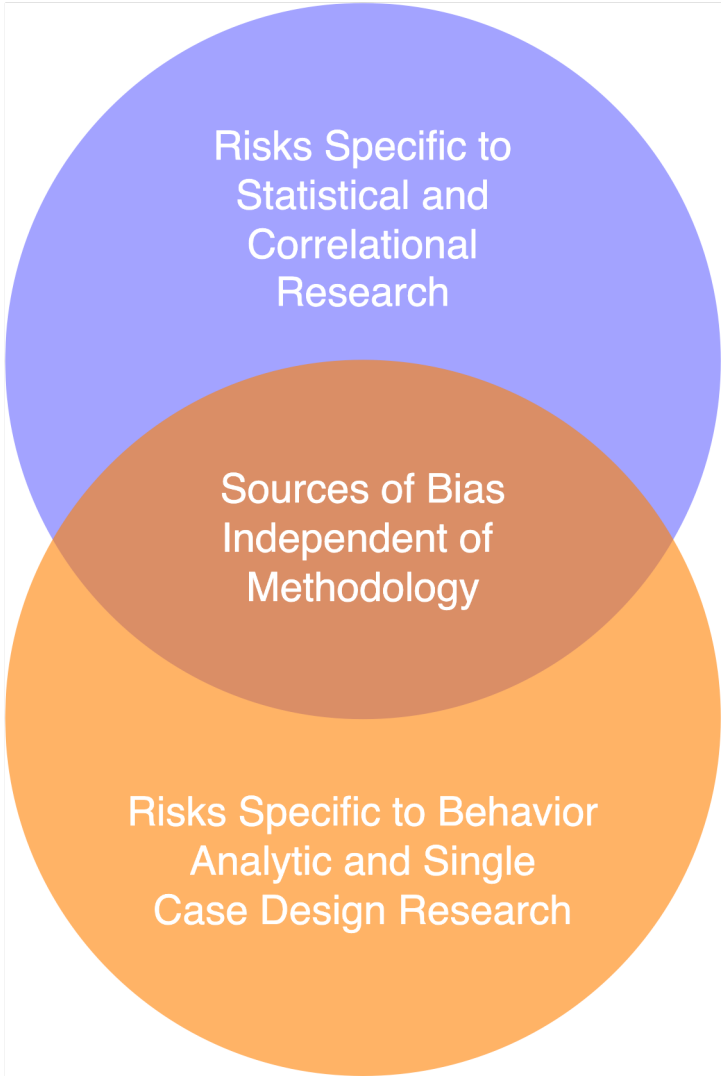
- Pre-establishing plans for data (i.e., minimizing the risk of exploring multiple analyses and reporting only the most favorable outcomes; **p-hacking**)

Distinguishing Planned and Unplanned Study Questions

- Mitigating temptation to Hypothesize After Results are Known (HARKing)

- Ensuring that post hoc questions are not presented as planned questions

Preregistration, But for Single-Case Design



Some risks of bias are *more critical* to non-SCD Research

- Existing strengths with transparency of study methods and procedures

- SCD research is less prone to the “fishing” associated with statistics-heavy research approaches

Some risks of bias *are just as critical* for SCD Research

- Incomplete reporting, e.g. attrition, certain participants dropped from a study, not all behavioral outcomes reported

- Presentation of post hoc or exploratory questions as confirmatory, e.g. serendipitous findings framed as planned

- Selectively reporting study research aims/questions, e.g. reporting only aims with favorable/consistent findings

Support for SCD Study Preregistration

Original Research

Preregistration in Single-Case Design Research

Exceptional Children
2019, Vol. 86(1) 95–112
© The Author(s) 2019
DOI: 10.1177/0014402919868529
journals.sagepub.com/home/ecx
SAGE

Austin H. Johnson[1] and Bryan G. Cook[2]

Supporting SCD Preregistration Practices

- Calls for consideration of preregistration in SCD research

- Recommendations and guideline for the practice in SCD research are still being developed/refined

Supporting SCD Research Aligned with Open Science

- Increasingly powerful archiving systems with *general* support for archiving/timestamping elements of research (e.g., OSF)

- Systems with *dedicated support* for SCD research questions and methods have begun to emerge (i.e., REES/SREE)

- Pre-registration of studies inclusive of SCD research in SREE increasing year-over-year

Location of SREE Registry: https://sreereg.icpsr.umich.edu/sreereg/

Information from SREE Repository

SCD Preregistration Limited as Present

- Growing rates of study pre-registration within the SREE repository over time (~200/year at present)

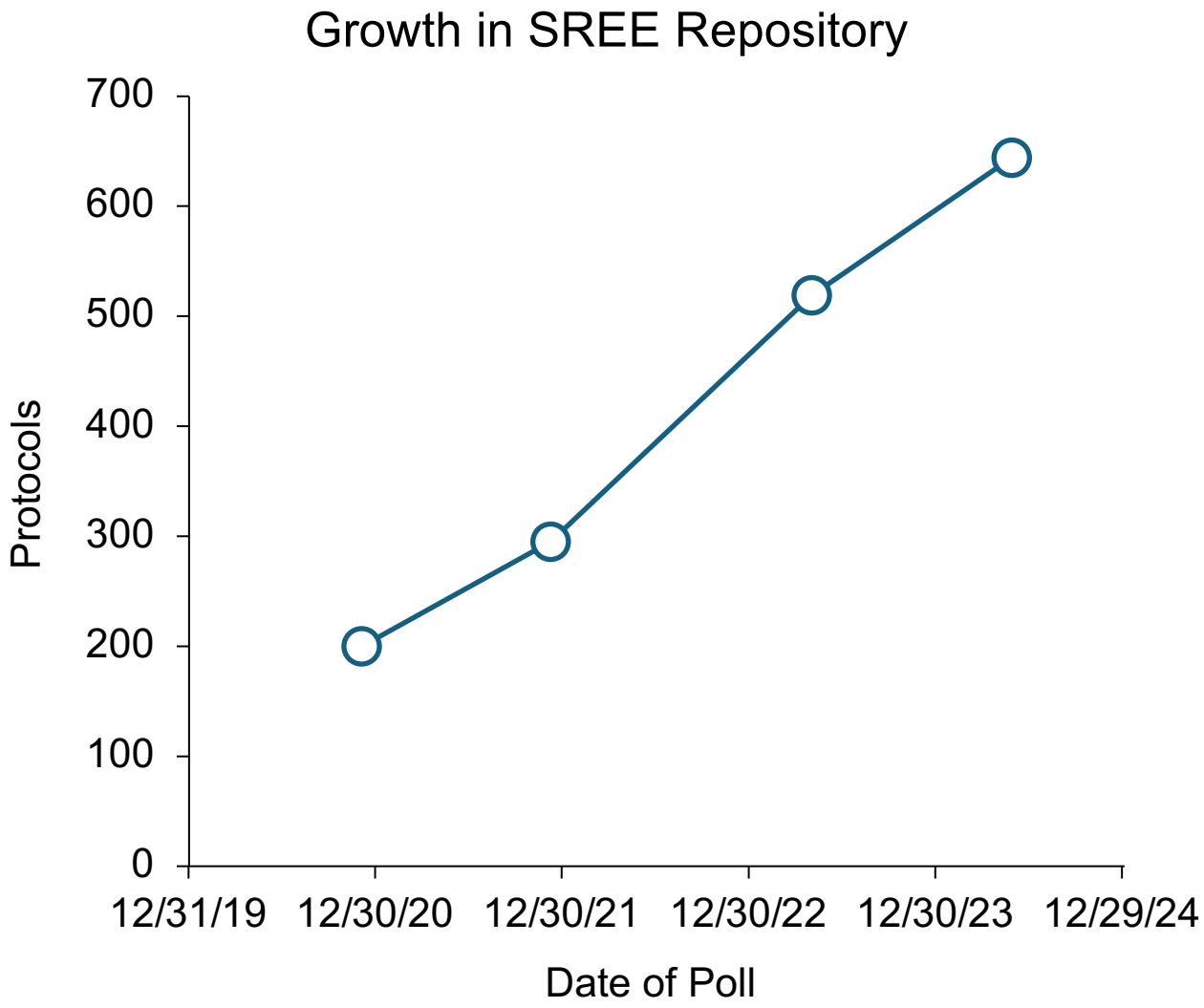
- Representation of SCD studies specifically in this number is much lower at present

- **Less than 50 protocols (<10%) are presently registered as using a SCD research approach**

Some Potential/Hypothesized Barriers

- Lack of clear guidance on how/when preregistration benefits SCD researchers

- Limited knowledge/visibility of SCD-specific options for study preregistration



Note: Information on SREE repository contents is provided openly. SCD-specific entries are only available for the present moment.

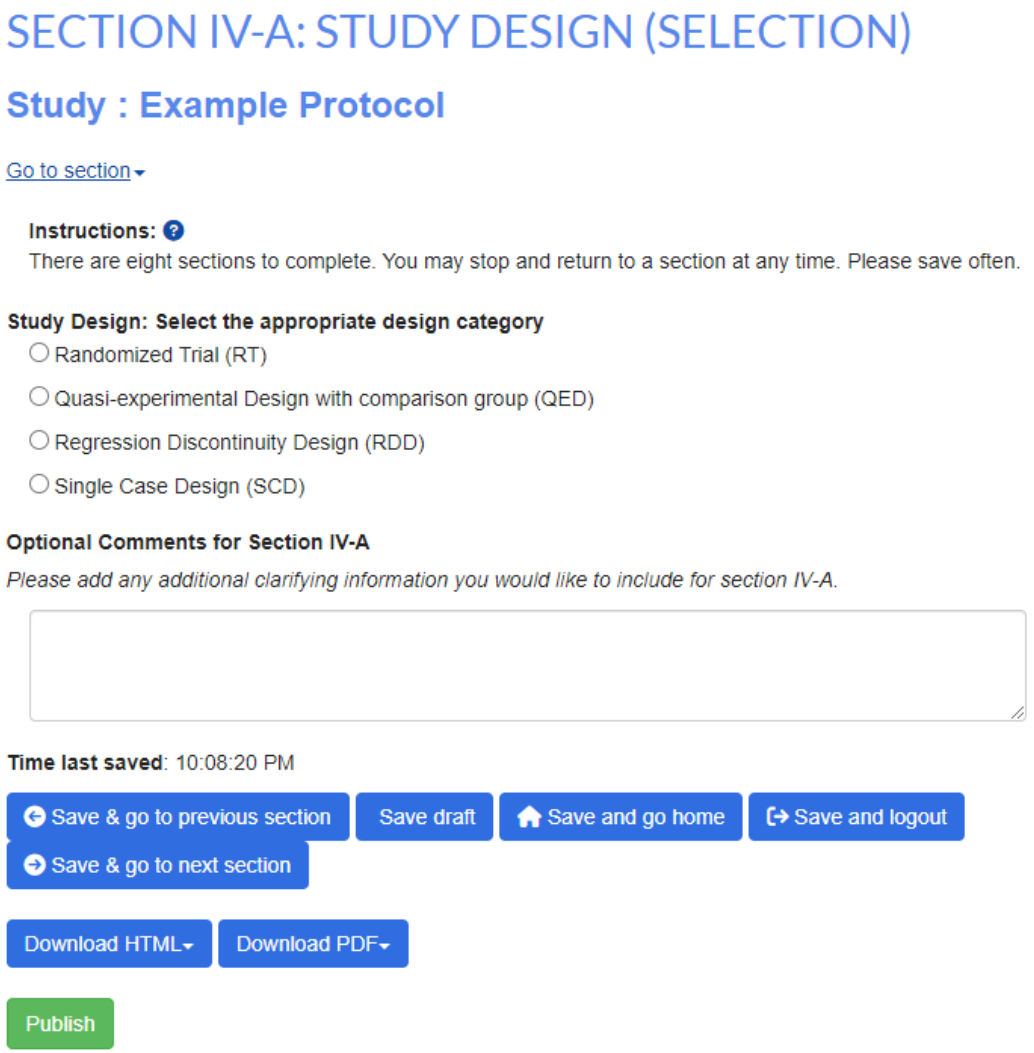
Elements of SCD Preregistration (SREE, 1/2)

1. Goals of Research/Questions
- Outline research questions (or general goals)
- Operationalize the IV and conditions explored

2. Participant Characterization/Recruitment
- Characterize the intended learner/sample
- Plans for recruiting, determining fit with study

3. Research Design (per Goals/Questions)
- State design used, relevance to goals for the study
- Criteria for introducing/removing conditions
- Steps taken to minimize risks of harm

4. Relevant Dependent Measures
- Operationalize/outline all relevant DVs
- Plans for including/disregarding any DVs

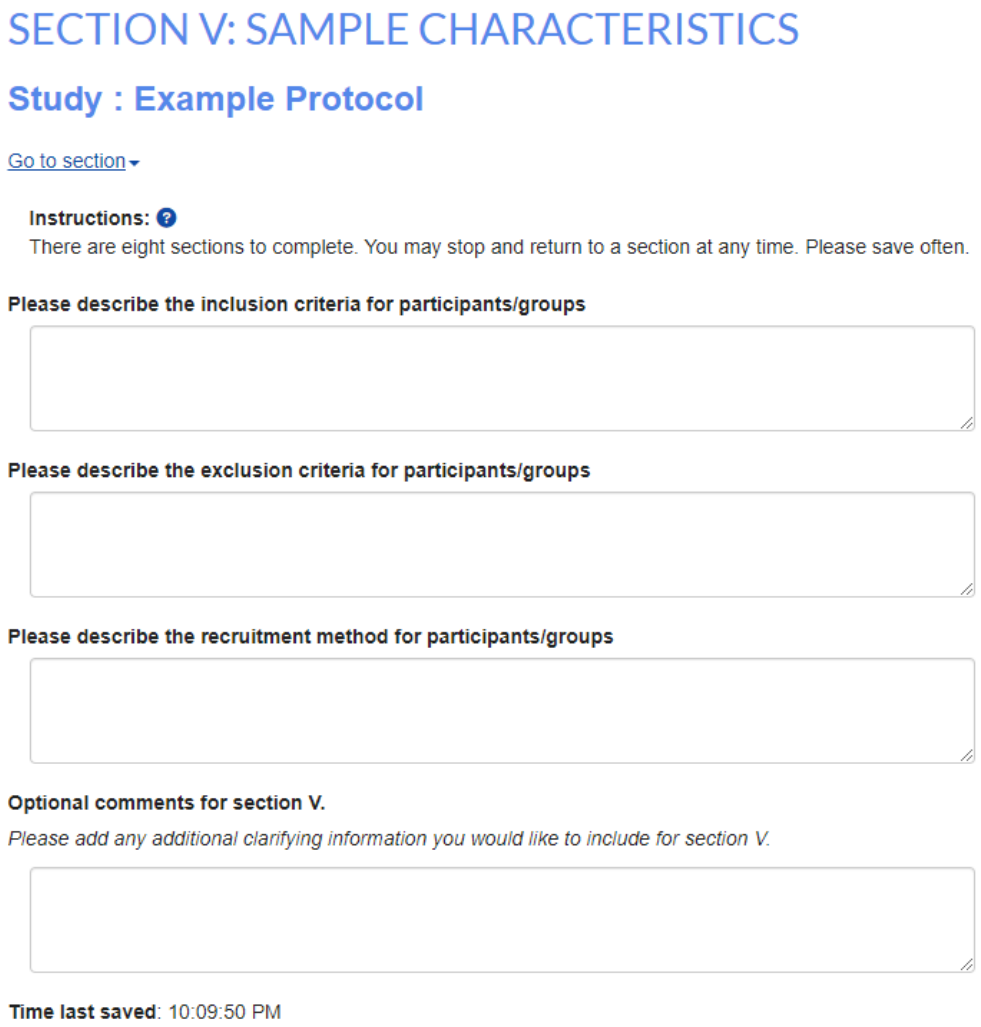


Elements of SCD Preregistration (SREE , 2/2)

5. Experimental Variables/Conditions
- Procedures for Baseline/Experimental phases
- Introduction/removal of experimental conditions
- Steps taken to ensure procedural fidelity

6. Establishment of Social Validity
- Outline steps taken to establish social validity before and following participation in the study
- Document efforts to establish direct as well as indirect forms of social validity

7. Analytical Strategy
- Describe the process for determining the presence/absence of function relation
- Plans for analyzing study data (if relevant) and decision-making regarding deviations from that plan



Preregistration: Some Caveats

A Good Practice, But No Magic Bullet

- Preregistration alone cannot prevent or expose all forms of QRPs (SCD or not)

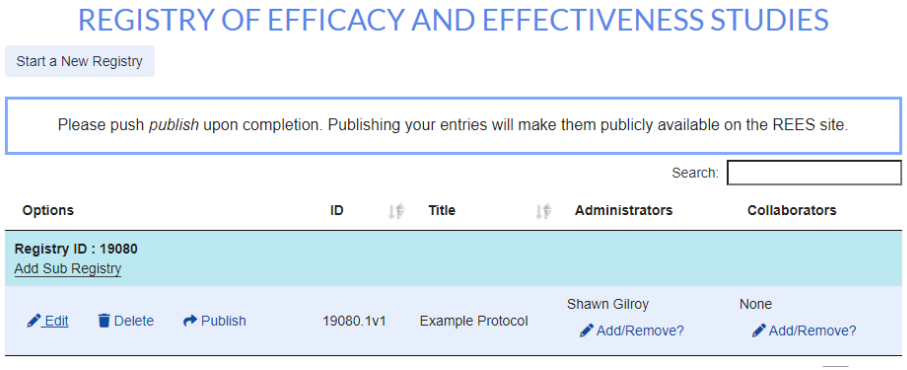
- Openness and transparency in research is valued, but direct benefits/outcomes are still emerging

- Guidelines for SCD researchers are still being actively explored/developed

Non-zero Added Increase in Response Effort

- Dedicated support for SCD research now exists but still requires additional work of SCD researchers

- Similarly puts additional demands on over extended journal editors/reviewers, research outlets



Various Options for SCD Researchers

Society for Research on Educational Effectiveness (SREE)
- Registry with templates for group designs/SCEDs in education and other related fields

- Link: https://sreereg.icpsr.umich.edu/sreereg/

Open Science Framework (OSF)
- General repository (some research templates) for various types of research projects and products

- Link: https://osf.io/

General Purpose Open Repository (e.g., GitHub, GitLab)
- Agnostic framework for committing resources (e.g., data, syntax) in public repositories under version control

- Link: https://github.com, https://gitlab.com

Contact and References

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Resources:
Website: https://smallnstats.com
Projects: https://github.com/miyamot0

References/Useful Resources:

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