Key Algorithms Implemented in the Simulation

Brief, generic descriptions of key algorithms and formulas implemented in this paper's simulation are listed below. More details are available in the supplemental, Microsoft Excel ©2016 file that accompanies the paper. The Excel file implements all the algorithms for generating the set-up values for each pass of the simulation, and for determining the corresponding outputs of the methods being compared. All the data generated by the simulation run are also included in the Excel file.

For each pass:

- **Set up**: Null mean = 100.
  - Values for **μ, σ, n,** and **MPSD** generated randomly, per description in Section 2.1
- **Sampling:** Generate a sample by making **n** independent random selections from a normally distributed population having population mean **μ** and standard deviation **σ.**
  - *From the obtained sample*, calculate its mean ($\bar{x}$) and standard deviation (**s**).
- **Sample Distance Magnitude** (Sample-based point estimate for effect size)
  = | $\bar{x}$ - 100 | (*i.e., Absolute value of ((Sample Mean) - (Null Mean))*
- **Test Statistic T** (Conventional test statistic, for the distance of $\bar{x}$ from (null = 100))
  = ((Sample mean) - (Null Mean)) / (Sample-based Standard Error)
  = **($\bar{x}$ - 100) / (s / $\sqrt{n}$)**
- **P-values** (Calculated by computer, based on a presumed **T**-distribution for the sampling distribution of the sample means.)
  - **Two-tailed p-value** = **Probability(|T|≥ |Test Statistic T|,** where **df = (n-1))**
  - **One-tailed p-value** = **Probability(T ≥ Test Statistic T,** where **df = (n-1))**
    (i.e. right-tailed.)
- **Interval-based inference indicator**

- First, identify the **numeric range of the thick null interval:**

  ➔ **{The interval from (Null mean – MPSD) to (Null mean + MPSD)}**

- Next, identify the **numeric range of a sample-based 95% confidence interval estimate for the mean:**

  ➔ **Lower Bound:** (Sample Mean) **-** (1.96 x (Sample-based Standard Error))

  $$= \bar{x} - (1.96 \times (s / \sqrt{n})$$

  Upper Bound: (Sample Mean) **+** (1.96 x (Sample-based Standard Error))

  $$= \bar{x} + (1.96 \times (s / \sqrt{n})$$

- **The Interval-based inference indicator takes a value = 0 if those two, specified intervals do not overlap.**

  - Specific values for the indicator when not equal to zero are also calculated, using algorithms described in Blume et al. (2018), and stored in the attached data file. These are for readers' interest and are not used in the present analyses.

- **Inference Indications (Decisions) Used in the Simulation's Models**
  - **Conventional p-value method**
    - *Two-tailed tests*: **If Two-tailed p-value ≤ 0.05, Reject H_0; else Do not reject**
    - *One-tailed tests*: **If One-tailed p-value ≤ 0.05, Reject H_0; else Do not reject**
  - **Small Alpha p-value method** *(Only two-tailed tests were assessed.)*

    If Two-tailed p-value ≤ 0.005, Reject H_0; else Do not reject
  - **MESP method**
    - *Two-tailed tests*: **If Two-tailed p-value ≤ 0.05**

      <u>and</u> Sample Distance Magnitude at least MPSD,

      Reject H_0; else Do not reject
    - *One-tailed tests*: **If One-tailed p-value ≤ 0.05**

      <u>and</u> Sample Distance Magnitude at least MPSD,

      Reject H_0; else Do not reject

- **Distance-Only method**

  If Sample Distance Magnitude at least MPSD, Reject H_0; else Do not reject

- **Interval-Based method**

  If the Interval-based inference indicator = 0, Reject H_0; else Do not reject