500 Class 04

https://thomaselove.github.io/500-2023/

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Today's Agenda

Today's class mostly involves a walk-through of the `toy` example, which is a simple simulated observational study of a treatment on three outcomes (one quantitative, one binary, and one time-to-event) which we will use to demonstrate the completion of 13 tasks using R, which include:

- Fitting a propensity score model
- Assessing pre-adjustment balance of covariates
- Estimating the effects of our treatment on our outcomes ...
  - Using matching on the propensity score
  - Using subclassification on the propensity score
  - Using direct adjustment for the propensity score
  - Using weighting on the propensity score

Note we have three other (more realistic) examples we'll share in time: `lindner`, `dm2200` and `rhc`.

Section 1

The `toy` Example

The `toy` example

The `toy` example presents methods for doing 1:1 greedy matching without replacement using the `Match` function from the `Matching` package, and for evaluating the balance before and after matching with `cobalt` and with an alternative strategy for obtaining Love plots.

- The example uses 3 Rules I attribute to Rubin (2001) for determining when a sample comparison shows sufficient balance to allow for a reasonable regression model for the outcome.
  - **Please read** Rubin (2001) in advance of Class 6, which will mostly be about that example.
- What to do in terms of a sensitivity analysis is discussed in the final section of that example, and we'll get to that later on.

Section 2

Rosenbaum, Chapter 3

Causal Inference in Randomized Experiments

- How do we test whether no effect is plausible?
  - A uniformity trial (where everyone is treated in the same way) is a helpful way of thinking about how you'd assess this
- Randomization is really making a random selection from a group of possible treatment assignments
- The Logic and Mechanics of Hypothesis Tests of No Treatment Effect
  - If the treatment effect is zero, would we ever see data like these?
  - P values, significance levels, Rejecting and Retaining the Null
- How large is the treatment effect?
  - Requires some assumptions, even in randomized trials