Constructs
Population vs Sample
Experimentation

1 — Intro to statistical research methods

1.1 Constructs

Definition 1.1 — Construct. A construct is anything that is difficult to measure because it can be defined and measured in many different ways.

Definition 1.2 — Operational Definition. The operational definition of a construct is the unit of measurement we are using for the construct. Once we operationally define something it is no longer a construct.

■ **Example 1.1** Volume is a construct. We know volume is the space something takes up but we haven't defined how we are measuring that space. (i.e. liters, gallons, etc.) ■

R Had we said volume in *liters*, then this would **not** be a construct because now it is operationally defined.

■ **Example 1.2** Minutes is already operationally defined; there is no ambiguity in what we are measuring. ■

1.2 Population vs Sample

Definition 1.3 — Population. The population is *all* the individuals in a group.

Definition 1.4 — Sample. The sample is *some* of the individuals in a group.

Definition 1.5 — Parameter vs Statistic. A *parameter* defines a characteristic of the population whereas a *statistic* defines a characteristic of the sample.

■ **Example 1.3** The mean of a population is defined with the symbol μ whereas the mean of a sample is defined as $\bar{x}$ ■

1.3 Experimentation

Definition 1.6 — Treatment. In an experiment, the manner in which researchers handle subjects is called a treatment. Researchers are specifically interested in how different treatments might yield differing results.

Definition 1.7 — Observational Study. An observational study is when an experimenter watches a group of subjects and does not introduce a treatment.

R A survey is an example of an observational study

Definition 1.8 — Independent Variable. The independent variable of a study is the variable that experimenters choose to manipulate; it is usually plotted along the x-axis of a graph.

Definition 1.9 — Dependent Variable. The dependent variable of a study is the variable that experimenters choose to measure during an experiment; it is usually plotted along the y-axis of a graph.

Definition 1.10 — Treatment Group. The group of a study that receives varying levels of the independent variable. These groups are used to measure the effect of a treatment.

Definition 1.11 — Control Group. The group of a study that receives no treatment. This group is used as a baseline when comparing treatment groups.

Definition 1.12 — Placebo. Something given to subjects in the control group so they think they are getting the treatment, when in reality they are getting something that causes no effect to them. (e.g. a Sugar pill)

Definition 1.13 — Blinding. Blinding is a technique used to reduce bias. Double blinding ensures that both those administering treatments and those receiving treatments do not know who is receiving which treatment.