Designing Studies Introduction

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Now that we have learned about the first stage of data production— sampling—we can move on to the next stage—designing studies.

Introduction

Obviously, sampling is not done for its own sake. After this first stage in the data production process is completed, we come to the second stage, that of gaining information about the variables of interest from the sampled individuals. In this module we'll discuss three study designs; each design enables you to determine the values of the variables in a different way. You can:

- Carry out an **observational study**, in which values of the variable or variables of interest are recorded as they naturally occur. There is no interference by the researchers who conduct the study.

- Take a **sample survey**, which is a particular type of observational study in which individuals report variables' values themselves, frequently by giving their opinions.

- Perform an **experiment**. Instead of assessing the values of the variables as they naturally occur, the researchers interfere, and they are the ones who assign the values of the explanatory variable to the individuals. The researchers "take control" of the values of the explanatory variable because they want to see how changes in the value of the explanatory variable affect the response variable. (Note: By nature, any experiment involves at least two variables.)

The type of design used, and the details of the design, are crucial, since they will determine what kind of conclusions we may draw from the results. In particular, when studying relationships in the Exploratory Data Analysis unit, we stressed that an association between two variables does not guarantee that a causal relationship exists. In this module, we will explore how the details of a study design play a crucial role in determining our ability to establish evidence of causation.

Here is how this section is organized:

We'll start this section by learning how to identify study types. In particular, we will highlight the distinction between observational studies and experiments.

We will then discuss each of the three study designs mentioned above.

- We'll discuss observational studies, focusing on why it is difficult to establish causation in these type of studies, as well as other possible flaws.
- We'll then focus on experiments, learning, among other things, that when appropriately designed, experiments **can** provide evidence of causation.
- We'll end the module by discussing surveys and sample size.
