

## 2.1: Types of Data and How to Collect Them

In order to use statistics, we need data to analyze. Data come in an amazingly diverse range of formats, and each type gives us a unique type of information. In virtually any form, data represent the measured value of variables. A **variable** is simply a characteristic or feature of the thing we are interested in understanding. Let's imagine we want to conduct a study to measure the stress level of students who are taking PSY 230. We will administer the survey during the first week of the course. One question we will ask is, "How stressed have you been in the last 2 weeks, on a scale of 0 to 10, with 0 being not at all stressed and 10 being as stressed as possible?"

- **Variable** is a condition or characteristic that can take on different values. In our example, the variable was stress, which can take on any value between 0 and 10. Height is a variable. Social class is a variable. One's score on a creativity test is a variable. The number of people absent from work on a given day is a variable. In psychology, we are interested in people, so we might get a group of people together and measure their levels of anxiety (a variable) or their physical health (another variable). You get the point. Pretty much anything we can count or measure can be a variable.
  - Once we have data on different variables, we can use statistics to understand if and how they are related.
- A **value** is just a number, such as 4, -81, or 367.12. A value can also be a category (word), such as male or female, or a psychological diagnosis (major depressive disorder, post-traumatic stress disorder, schizophrenia).
  - We will learn more about values and types of data a little later in this chapter.
- Each person studied has a particular **score** that is his or her value on the variable. As we've said, your score on the stress variable might have a value of 6. Another student's score might have a value of 8.

We also need to understand the nature of our data: what they represent and where they came from. We will briefly review some keys to understanding statistical studies.

### *Tips to understanding statistical studies*

Here are a few key considerations for evaluating studies using statistics.

1. Know the basic components of a statistical investigation.
2. Know the sample. Identify if using a representative sample.
3. Identify the sample size. Evaluate if using a large enough sample.
4. Understand and evaluate the study design.
5. Identify type of data working with.
6. Understand the statistics used.
7. Evaluate conclusions made from statistical findings.

### **The basic components to a statistical investigation**

- **Planning the study:** Start by asking a testable research question and deciding how to collect data. For example, how long was the study period of the study? How many people were recruited for the study, how were they recruited, and from where? How old were they? What other variables were recorded about the individuals, such as smoking habits, on the comprehensive lifestyle questionnaires?
- **Examining the data:** What are appropriate ways to examine the data? What graphs are relevant, and what do they reveal? What descriptive statistics can be calculated to summarize relevant aspects of the data, and what do they reveal? What patterns do you see in the data? Are there any individual observations that deviate from the overall pattern, and what do they reveal?
- **Inferring from the data:** What are valid statistical methods for drawing inferences "beyond" the data you collected? Is a 10%–15% reduction in risk of death something that can happen just by chance?
- **Drawing conclusions:** Based on what you learned from your data, what conclusions can you draw? Who do you think these conclusions apply to? Can you draw a cause-and-effect conclusion about your treatment? (note: we are about to learn more about the study design needed for this)

Notice that the *numerical analysis* ("crunching numbers" on the computer) comprises only a small part of the overall statistical investigation. In this module, you will see how we can answer some of these questions and what questions you should be asking about any statistical investigation you read about. In the end, statistics provides us a way to give a very objective "yes" or "no" answer to the question, "is this treatment or intervention effective and, if so, how effective is it?" Nearly all statistical techniques



boil down to answering these questions. Statistics is all about helping make correct and reliable decisions in our chosen field of study. But even if you never plan on conducting research or pursuing a career where you have to use statistics, the material in this course will help you in your daily life. In today's world of instant gratification, information overload, and the 24-hour news cycle, statistics are thrown at us nonstop. Soon, you will be able to determine if the person or group providing these statistics is being honest or manipulating the data to suit their ideas.

Let's learn a little bit more about what is needed to know to better understand statistics.

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