

What you will learn about:
Statistical Studies

The three main types of statistical studies are described below.

- **sample survey or poll:** You observe a random sample in order to estimate a characteristic of the larger population from which the sample was taken. Getting a **random sample of size n** is equivalent to writing the name of every member of the population on a card, mixing the cards well, and drawing n cards.
 - **experiment:** You randomly assign two (or more) treatments to the available subjects in order to see which treatment is the most effective.
 - **observational study:** The conditions you want to compare come already built into the subjects that are observed. Typically, no randomization is involved.
1. Suppose you want to investigate the effects of exercise on the blood pressure of students in your school. You have thought about three different study designs. Classify each design as a sample survey, an experiment, or an observational study.

Study 1: You ask for volunteers from the students in your school and get 30 students willing to participate in your study. You randomly divide them into two groups of 15 students. You ask one group not to exercise at all for the next week, and you ask the other group to do at least 30 minutes of exercise each day. At the end of the week, you find that everyone complied with your instructions. You then take each student's blood pressure. You find that the mean blood pressure of the students who exercised is lower than the mean blood pressure of the students who did not exercise.

Experiment - Subjects selected at Random and given different treatments.

Study 2: You get a list of all students in your school and use a random digit table to select 30 of them for your study. You take these students' blood pressure and then have them fill out a questionnaire about how much exercise they get. You divide them into those who exercise a lot and those who exercise less. You find that the mean blood pressure of the students who exercise more is lower than the mean blood pressure of the students who exercise less.

Sample size - Randomly select a smaller group from larger population

Study 3: You discover that the nurse in the health office at your school has taken the blood pressure of 157 students who have visited the health office over the past year for a variety of reasons. In some cases, they felt sick; and in other cases, they had to turn in routine paperwork. You get the names of these students and have them fill out a questionnaire about how much exercise they get. You find that the mean blood pressure of the students who exercise more is lower than the mean blood pressure of the students who exercise less.

Observational Study → No random selection.

2. In each study in problem 1, there was an association between amount of exercise and blood pressure. Assume that in each case the difference in mean blood pressure was statistically significant. Answer the following questions for each study in Problem 1.
 - a. Is it reasonable to conclude that it was exercise that caused the lower blood pressure? Explain your thinking.

Study 1

Study 2

	<p>Study 3</p> <p>b. Can you generalize the results of this study to all of the students in your school? Explain your thinking?</p> <p>Study 1</p> <p>Study 2</p> <p>Study 3</p> <p>c. <u>Exactly</u> what can you conclude from this study?</p> <p>Study 1</p> <p>Study 2</p> <p>Study 3</p>
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	<p>3. Refer to the Problem 6 Part c on page 6 about students who take AP examinations in high school.</p> <p>a. What type of study is this?</p> <p>b. State the conclusion that can be drawn.</p> <p>4. Every four year, the Gallup organization tries to predict the winner of the U.S. presidential election. They do this by first creating a list of all possible household phone numbers in the United States. They then phone several thousand households using random digit dialing, calling back if no one answers. <u>An adult is selected at random</u> from each household and interviewed about whether he or she intends to vote and for whom.</p> <p>a. What type of study is this?</p> <p>b. Explain why households cannot be selected by phone books.</p> <p>c. Are all adults in the United State equally likely to be in the sample? Explain.</p>
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