

Research Questions about a Population

1. Give an example of a population we might be interested in studying.

2. Give an example of a research question that involves estimating a characteristic about the population of part-time students at your college.

3. Improve this poorly stated research question: Do students work a lot of hours?

4. Which research question is poorly stated because it does not specify a population?
 - a. What is your commute time when you drive to school?
 - b. What is the average commute time for faculty working at a community college in California?
 - c. What proportion of college students take online classes?

Research Questions about Cause and Effect

5. Which of the following questions is stated as a cause-and-effect question?
 - a. Is lack of health insurance linked to shorter life expectancy?
 - b. Is maternal smoking associated with low birth weight?
 - c. Do instructors who learn their students' names receive higher ratings on student evaluations?
 - d. Does tutoring correlate with improved performance on exams?

6. Make up a cause-and-effect research question.

7. Distinguish between an **observational study** and an **experiment**. What are the primary purposes of each and how is one different from the other?

8. Over a 17-year period researchers studied a sample of 707 individuals from a single community. They recorded the number of hours each individual spent watching television during adolescence and early adulthood. In later years, they recorded the number of aggressive acts by individuals in the study. *Science* magazine published the results in 2002 in an article titled “Television Viewing and Aggressive Behavior during Adolescence and Adulthood.”

Pick the best description of this study:

- a. an experiment to establish a cause-and-effect relationship between two variables
- b. an observational study to make an estimate or a claim about a population
- c. an observational study of an association between two variables.

9. What is the explanatory variable in this study?

Explanatory: _____ Response: _____

10. Educational psychologists investigate the impact of different types of instruction on learning. In one study, researchers taught a math lesson to 9th-graders using the “Inventing to Prepare for Learning (IPL)” instructional cycle. A second group of students received traditional “tell and practice” instruction. After the lessons, both groups studied a worked example of a math problem on their own. Then they took a test that included problems like the worked example. The journal *Cognition and Instruction* published the results in 2004. Pick the best description of this study:

- a. an observational study to make an estimate or a claim about a population
- b. an experiment to establish a cause-and-effect relationship between two variables
- c. an observational study of an association between two variables

11. In a study of cell phones and the risk of brain cancer, researchers studied a group of 469 people with brain cancer. They paired each person who had brain cancer with a person of the same sex, of similar age, and the same race who did not have brain cancer. Then they compared the cell phone use for each pair of people. *The Journal of the American Medical Association* published the results in 2000 in an article titled “Handheld Cellular Telephone Use and the Risk of Brain Cancer.”

Pick the best description of this study:

- a. an observational study to make an estimate or a claim about a population
- b. an experiment to establish a cause-and-effect relationship between two variables
- c. an observational study of an association between two variables

12. In June 2011 *The Washington Post* published the results of a poll about the war in Afghanistan. In the poll 1,502 U.S. adults answered the question, “Do you think the U.S. made the right decision or the wrong decision in using military force in Afghanistan?”

- a. an experiment to establish a cause-and-effect relationship between two variables
- b. an observational study to make an estimate or a claim about a population
- c. an observational study of an association between two variables

Explanatory and Response Variables

In the early 1990s, observational studies suggested that hormone replacement therapy had additional benefits, including a reduction in the risk of heart disease. In these observational studies, researchers compared women who took hormones to those who did not take hormones. Health records showed that women taking hormones after menopause had a lower incidence of heart disease.

13. From the study above, describe some factors that would confound the conclusion that hormone replacement therapy leads to additional health benefits.

In 2002, the Women's Health Initiative sponsored a large-scale, well-designed experiment to study the health implications of hormone replacement therapy. In this experiment, researchers randomly assigned over 16,000 women to one of two treatments. One group took hormones. The other group took a **placebo**. The experiment was **double-blind**.

14. Explain the purpose of the placebo in the study described above.
15. What does double-blind mean in this situation?
16. What is the explanatory variable in the experiment? What is the response variable?
Explanatory: _____ Response: _____
17. The conclusion of the **experiment** described above was that the group taking hormones had a higher incidence of heart disease and breast cancer. This contradicts the conclusion of the **observational study**. Which one is right and why did the other appear to get it so wrong?
18. In general observational studies should not be used to assert a cause and effect relationship (as exemplified in the discussion above). Why is this?
19. There are, however, exceptions. What conditions must be addressed in order to conclude a cause and effect relationship in an observational study?