

AP Statistics

Statistical Studies #1

Name _____

1. A University of Helsinki (Finland) study wanted to determine if chocolate consumption during pregnancy had an effect on infant temperament at age 6 months. Researchers began by asking 305 healthy pregnant women to report their chocolate consumption. Six months after birth, the researchers asked mothers to rate their infants' temperament, including smiling, laughter, and fear. The babies born to women who had been eating chocolate daily during pregnancy were found to be more active and "positively reactive" – a measure that the investigation said encompasses traits like smiling and laughter.

a) Was this an observational study or an experiment? Justify your answer.

(observational study – no treatments were imposed)

b) What are the explanatory and response variables?

(explanatory – chocolate consumption during pregnancy response – infant temperament at age 6 months)

c) Are there any confounding variables?

(eating chocolate makes the mother happy and it is the happiness that causes the infants to be happy)

d) Does this study show that eating chocolate regularly during pregnancy helps produce infants with good temperament? Explain.

(No. Observational studies cannot show cause-and-effect.)

2. A study of child care enrolled 1364 infants and followed them through their sixth year in school. Later, the researchers published an article in which they stated that "the more time children spent in child care from birth to age four-and-a-half, the more adults tended to rate them, both at age four-and-a-half and at kindergarten, as less likely to get along with others, as more assertive, as disobedient, and as aggressive.

a) Is this an observational study or an experiment? Justify your answer.

(Observational study – no treatment was imposed)

b) What are the explanatory and response variables?

(explanatory – time spent in child care from birth to age 4 response – adult rating of children's behavior)

c) Are there any confounding variables?

(adults have a negative opinion of children in child care, therefore rate them lower.)

d) Does this study show that child care causes children to be more aggressive? Explain.

(No. Observational studies cannot show cause-and-effect)

3. An educator wants to compare the effectiveness of computer software for teaching biology with that of a textbook presentation. She gives a biology pretest to each of a group of high school juniors, then randomly divides them into two groups. One group uses the computer, and the other studies the text. At the end of the year, she tests all the students again and compares the increase in biology test scores in the two groups.

a) Is this an observational study or an experiment? Justify your answer.

(experiment – students were randomly assigned to different treatments)

b) What are the explanatory and response variables?

(explanatory – computer software for teaching biology response – student's understanding of biology)

c) Are there any confounding variables?

(students may like working on a computer and that causes an increase in their knowledge)

d) If the group using the computer has a much higher average increase in test scores than the group using the textbook, what conclusions, if any, could the educator draw?

(experiment with randomization therefore she can conclude that the software improves student's knowledge)

4. Do smaller classes in elementary school really benefit students in areas such as scores on standardized tests, staying in school, and going on to college? We might do an observational study that compares students who happened to be in smaller and larger classes in their early school years. Identify a confounding variable that may affect the effects of smaller classes. Explain how confounding might occur.
(Smaller classes might occur in private schools versus larger classes in public schools. Thus it is the private schooling and not the class size that causes the results.)
5. A common definition of “binge drinking” is 5 or more drinks at one sitting for men and 4 or more for women. An observational study finds that students who binge drink have lower average GPA than those who don’t. Identify a confounding variable which could affect the results due to binge drinking.
(Academic motivation might be leading to lower grades. Students with low academic motivation might party more and therefore participate in binge drinking.)
6. Ability to grow in shade may help pines found in the dry forests of Arizona to resist drought. How well do these pines grow in shade? Investigators planted pine seedlings in a greenhouse in either full light, light reduced to 25% of normal by shade cloth, or light reduced to 5% of normal. At the end of the study, they dried the young trees and weighed them.
- a) What are the experimental units or subjects? *Pine seedlings*
- b) What is/are the explanatory variable(s) (factors)? *Light intensity*
- c) What are the treatments? *Full light, 25% light, and 5% light.*
- d) What is the response variable? *Dry weight at the end of the study.*