

A college fitness center offers an exercise program for staff members who choose to participate. The program assesses each participant's fitness using a treadmill test, and also administers a personality questionnaire. There is a moderately strong positive correlation between fitness score and score for self-confidence.

1. Explain to someone who knows no statistics what the last sentence means.

Staff members who had lower fitness scores tended to also earn lower self-confidence scores. Those that scored high on the personality questionnaire tended to achieve higher fitness scores.

2. Do you think the observed association between personal fitness and self-confidence is a result of causation, confounding, or common response? Justify your answer.

Many utility companies have introduced programs to encourage energy conservation among their customers. An electric company considers placing electronic meters in households to show what the cost would be if the electricity use at that moment continued for a month. It gives these meters to 100 of its customers for a year and then compares the average electricity use in these customers' homes this year to last year. *Result:* These customers' average electricity use decreased by 10%.

1. Is it possible that the use of the electronic meters *caused* customers to decrease their electricity use? Justify your answer.
2. Temperature is a possible lurking variable in this study. Would this variable result in confounding or common response? Justify your answer.

An article in a women's magazine says that women who nurse their babies feel warmer and more receptive toward the infants than mothers who bottle-feed. The author concludes that nursing has desirable effects on the mother's attitude toward the child.

1. Women choose whether to nurse or bottle-feed. Explain why this fact makes any conclusion about cause and effect untrustworthy. Use the language of lurking variables and confounding in your explanation.
2. Give another plausible explanation of the association between the decision to bottle-feed or nurse and mothers' attitudes toward their children. Explain clearly.

A state institutes a job-training program for manufacturing workers who lose their jobs. After five years, the state reviews how well the program works. Critics claim that because the state's unemployment rate for manufacturing workers was 6% when the program began and 10% five years later, the program is ineffective.

1. Identify a lurking variable whose effect on unemployment may be confounded with the effect of the training program. Explain how the confounding could occur.
2. Suppose that the workers who participated in the job-training program all volunteered to do so. How might this affect any conclusions about the effectiveness of the program? Explain.