

1. For each study described below, comment on the extent to which inferences can be drawn about a larger population and whether cause and effect can be established.
  - (a) A football coach thinks lessons in yoga will improve the flexibility of his players and thereby reduce injuries. To test his theory, he randomly divides the players on the team into two groups. One group has 45 minutes of yoga training each day. The players in the other group do the standard stretching routine the team has used in the past. He compares flexibility in the two groups at the end of the experiment.
  
  - (b) Does lack of sleep affect your academic performance? A student explores this question by asking everyone in his statistics class to write down on a piece of paper his or her score on a recent test and total number of hours of sleep he or she got on the last three nights before taking the test.
  
  - (c) Does “Cold-Cut,” a popular over-the-counter cold remedy that claims to reduce the length and severity of colds really work? A consumer advocacy group addresses this question by asking a random sample of 400 adults how many colds they’d had in the last six months, how long each cold lasted, and if they took “Cold-Cut” to treat the cold.
  
2. Preliminary observational studies have linked consumption of caffeine during pregnancy to a higher incidence of miscarriages. It would be unethical to run a controlled experiment to establish cause and effect in this situation. Describe two ways in which researchers can seek to establish cause and effect that do not involve experiments.

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### SG 4.3

1. (a) Random assignment → cause and effect can be inferred. No random sampling → Cannot generalize beyond the subjects of the study. (b) No random assignment → cause and effect cannot be inferred. No random sampling → Cannot generalize beyond the subjects of the study. (c) No random assignment → cause and effect cannot be inferred. Random sampling → Can generalize to population from which the random sample was selected. 2. Answers will vary.

Good general categories: establish a strong association between caffeine consumption and miscarriages in a wide variety of studies; establish a plausible mechanism for the impact of caffeine on miscarriages; show the association exists in studies that stratify for possible lurking variables, such as other health factors that may be confounding with caffeine consumption.