4.3: Using Studies Wisely

Okay, Mrs. Phillips... You’ll be in the machine for the next four hours. We’ll be monitoring your vitals to find out how annoyed you get during the experiment.

Section 4.3
Using Studies Wisely

After this section, you should be able to...

✓ DESCRIBE the challenges of establishing causation
✓ DEFINE the scope of inference
✓ DESCRIBE data ethics in designing studies

Scope of Inference
What type of inference can be made from a particular study?

Well-designed experiments randomly assign individuals to treatment groups. However, most experiments don’t select experimental units at random from the larger population. That limits such experiments to inference about cause and effect.

Most observational studies don’t randomly assign individuals to groups, which rules out inference about cause and effect. However, observational studies that use random sampling can make inferences about the population.

The Challenges of Establishing Causation
When we can’t do an experiment, we can use the following criteria for establishing causation.

• The association is strong.
• The association is consistent.
• Larger values of the explanatory variable are associated with stronger responses.
• The alleged cause precedes the effect in time.
• The alleged cause is plausible.

Discuss how each of these criteria apply to the observational studies of the relationship between smoking and lung cancer.

Data Ethics

• All planned studies must be reviewed in advance by an institutional review board charged with protecting the safety and well-being of the subjects.
• All individuals who are subjects in a study must give their informed consent before data are collected.
• All individual data must be kept confidential. Only statistical summaries for groups of subjects may be made public.