5B: Should You Believe a Statistical Study?

Class Activity

Although most statistical research is carried out with care, there may be aspects that can cause a study to be flawed, biased, or not enough information is given to support conclusions.

Eight Guidelines for Evaluating a Statistical Study

1. **Get a big picture view of the study**
   Identify the goals of the study, the population, the type of study, etc.

2. **Consider the source**
   Could the people running the study have bias?

3. **Look for bias in the sample**
   The sampling method should provide a representative sample.

   Selection Bias: occurs whenever researchers select their sample in a way that doesn't make it representative of the population.

   Participation Bias: occurs whenever people choose whether to participate. (often referred to as *self-selected* or *voluntary response* surveys)

4. **Look for problems in defining or measuring variables of interest**
   If there is any ambiguity in how the variables are defined then it can be difficult to interpret the results.

5. **Beware of confounding variables**
   If there are variables that are not controlled for they can confuse the results.

6. **Consider the setting and wording in surveys**
   The wording for a question may elicit an inaccurate response, even if that wasn't intended.

7. **Check that results are presented fairly**
   Although the survey may have been well done, the reporting or presentation may be misleading.

8. **Stand back and consider the conclusions**
   Does the conclusion make sense?

Clicker Questions

1. A study conducted by the oil company Exxon Mobil show that there was no lasting damage from a large oil spill in Alaska. This conclusion

a. is definitely invalid, because the study was biased.
b. may be correct, but the potential for bias means that you should look very closely at how the conclusion was reached.
c. could be correct if it falls within the confidence interval of the study.

2. Consider a study designed to learn about the social networks of all college freshman, in which researchers randomly interviewed students living in on-campus dormitories. The way this sample was chosen means the study will suffer from

a. selection bias.
b. participation bias.
c. confounding variables.

3. Consider a survey in which 1000 people are asked, "How often do you go to the dentist?" The variable of interest in this study is

a. the number of visits to the dentist.
b. the number of people surveyed.
c. the numbers 1 through 5.

4. The show American Idol selects winners based on votes cast by anyone who wants to vote. This means that the winner

a. is the person that most Americans want to win.
b. may or may not be the person that most Americans want to win, because the voting is subject to participation bias.
c. may or may not be the person most Americans want to win, because the voting should be double blind.

5. Which study design is the most credible?

a. A study financed by a major pharmaceutical company is intended to determine whether its new cholesterol drug is more effective than similar drugs by other companies.
b. A state Republican Party polls 1600 of its members to determine whether its candidate for the U.S. senate is likely to win against the democratic candidate.
c. A government study is designed to determine the percentage of taxpayers who understate their income, based on people who were selected for an audit.