Evaluating a Statistical Study

Most statistical research is carried out with integrity and care. Nevertheless, bias can arise in many different ways.

There are eight guidelines that can help you answer the question "Should I believe a statistical study?"

Get a big picture.

- What was the goal of the study?
- What was the population under study? Was the population clearly and appropriately defined?
- What type of study was used? Was the type appropriate for the goal?

Consider the source.

 Statistical studies are supposed to be objective, but the people who carry them out and fund them may be biased.

Look for bias in the sample.

- Researchers select their sample in a way that tends to make it unrepresentative of the population.
- People who feel strongly about an issue are more likely to participate, their opinions may not represent the larger population.

- Based solely on the information given, do you have reason to question the results of the following study?
- A TV talk show host asks the TV audience, "Do you support new national mileage standards for automobiles?" and asks people to vote by telephone at a toll-free number.

- Identify at least one potential source of bias in the following studies. Explain why the bias would or would not affect your view of the study.
- A college mails survey forms to all current seniors, asking for the students' choice of their alltime best and worst professors. Students are asked to return the survey in the campus mail.

- Identify at least one potential source of bias in the following studies. Explain why the bias would or would not affect your view of the study.
- In order to determine the opinions of people in the 25 to 35 year age group on requiring physical education in schools, researchers survey a random sample of 2500 professional athletes in this age group.

Look for problems in defining or measuring the variables of interest.

- A variable is any item or quantity that can vary or take on different values.
- The variables of interest in a statistical study are the items or quantities that the study seeks to measure.

- Based solely on the information given, do you have reason to question the results of the following study?
- Researchers design five survey questions to determine whether Norwegian citizens are happier than American citizens.

In a school district, a reading test shows that 35% of the school children scored below the national average for their grade. The school board then announced that 35% of the school children were reading "below grade level," and concluded that the methods of teaching reading needed to be changed. Do these data support the boards decision?

No, the national average score is not the same as "grade level." Note that 50% of all students scored less than the national average for their grade by definition.

Watch out for confounding variables.

 Variables that are not intended to be part of the study can sometimes make it difficult to interpret the results properly. Such variables are often called confounding variables, because they confound (confuse) a study's results.

- Based solely on the information given, do you have reason to question the results of the following study?
- To measure the academic preparation of middleschool mathematics teachers, a study used as its data the teachers' SAT mathematics scores.

Consider the setting and wording in surveys.

Even when a survey is conducted with proper sampling and with clearly defined terms and questions, it is important to watch out for problems in the setting or wording that might produce inaccurate or dishonest responses.

Check that results are presented fairly.

- The study may be misrepresented in graphs or concluding statements.
- Researchers may misinterpret the results or jump to conclusions not supported by the results.

Stand back and consider the conclusions.

Ask yourself the following questions.

- Did the study achieve its goals?
- Do the conclusions make sense?
- Can you rule out alternative explanations for the results?
- If the conclusions do make sense, do they have any practical significance?