

Section 5B

Should You Believe a Statistical Study?

Most statistical studies are performed to try to avoid bias and to get accurate results.

However, bias can arise in many different ways.

Guideline 1: Identify the Goal, Population, and Type of Study

From looking at a statistical study, you should be able to identify the goal, the population, and the type of study used.

If you can't identify these, it will be difficult to evaluate other aspects of the study.

Do you have reason to question the results of the hypothetical study? Explain your reasoning.

A state Democratic Party polls 2000 of its members to determine whether its candidate for the U.S. Senate is likely to win against the Republican candidate.

This study would most likely be biased. A member of the Democratic Party would think that their own candidate was better and would therefore likely win. They would not usually admit if they thought the Republican candidate might win.

Guideline 2: Consider the Source

You always need to consider who (or what group) is paying for the study and also who (or what group) is actually conducting the study.

Example: 9 of 10 dentists prefer Crest toothpaste.

Decide whether you would believe the stated claim. Justify your conclusion.

A new diet program claims that 200 randomly selected participants lost an average of 24.3 pounds in six weeks and that the program works for anyone with enough discipline.

You can probably believe their claim that participants lost an average of 24.3 pounds in six weeks because that is a reasonable amount. However, you should question the part that states that “the program works for anyone with enough discipline.” What is enough discipline?

Guideline 3: Look for Bias in the Sample

Selection bias occurs whenever researchers *select* their sample in a way that tends to make it unrepresentative of the population.

Participation bias occurs whenever people *choose* whether to participate. This occurs primarily with surveys and polls.

- Who is most likely to participate?
 - people who feel strongly about an issue

Guideline 4: 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.

Guideline 5: Watch Out for Confounding Variables

Sometimes variables that are not intended to be part of the study can make it difficult to interpret results properly.

Confounding variables confound (confuse) a study's results.

Guideline 6: Consider the Setting and Wording in Surveys

Dishonest responses are likely when the survey is about a sensitive subject.

The wording of questions or the order of words in a question can invite bias.

Guideline 7: Check that Results are Presented Fairly

Results can be misinterpreted in graphs or concluding statements.

We will talk more about misleading graphs in section 5D.

Look for inconsistencies between the interpretation of a study and any data given with it.

Guideline 8: Stand Back and Consider the Conclusions

Did the study achieve its goals?

Can you rule out alternative explanations for the results?

If the conclusions make sense, do they have any practical significance?