4.3
Using Studies Wisely

Scope of Inference - The scope of inference refers to the population to which inference can reasonably be drawn based on the study. This population is the population from which the random sample used in the study was drawn.

Inference about the population – requires that the individuals taking part in a study be randomly selected from the larger population.

Inference about cause and effect – requires random assignment of individuals to groups

		Were individuals randomly assigned to groups?	
		Yes	No
Were individuals randomly selected?	Yes	Inference about the population: YES Inference about cause and effect: YES	Inference about the population: YES Inference about cause and effect: NO
	No	Inference about the population: NO Inference about cause and effect: YES	Inference about the population: NO Inference about cause and effect: NO

Example

Many students insist that they study better when listening to music. A teacher doubts this claim and suspects that listening to music actually hurts academic performance. Here are four possible study designs to address this question at your school. In each case, the response variable will be the students' GPA at the end of the semester. What can we conclude from the following designs?

1. Get all the students in your AP Statistics class to participate in a study. Ask them whether or not they study with music on and divide them into two groups based on their answer to this question.

With no random selection, the results of the study should only be applied to the AP Statistics students in the study. With no random assignment, we should not conclude anything about cause-and-effect. All we can conclude is that AP Stats students who listen to music while studying have lower GPA's than those who do not listen to music. We don't know why and we can't apply these results to any larger group of students.

2. Select a random sample of students from your school to participate in a study. Ask them whether or not they study with music on and divide them into two groups based on their answer to this question.

With random selection, the results of the study can be applied to the entire population-in this case, all the students at this school. With no random assignment, however, we should not conclude anything about cause-and-effect. All we can conclude is that students at this school who listen to music while studying have lower GPA's than those who do not listen to music. We don't know why their GPA's are lower, however.

3. Get all the students in your AP Statistics class to participate in a study. Randomly assign half of the students to listen to music while studying for the entire semester and have the remaining half abstain from listening to music while studying.

With no random selection, the results of the study should only be applied to the AP Statistics students in the study. With random assignment, however, we can conclude that there is a cause-and-effect relationship between listening to music while studying and GPA, but only for the AP Statistics students who took part in the study.

4. Select a random sample of students from your school to participate in a study. Randomly assign half of the students to listen to music while studying for the entire semester and have the remaining half abstain from listening to music while studying.

With random selection, the results of the study can be applied to the entire population-in this case, all the students at this school. With random assignment, we can conclude that there is a cause-and-effect relationship between listening to music while studying and GPA for all the students at the school.