

## AP Statistics

### Experimental vs. Observational Studies - Part B

Study #1) The marketing department of Inter Miami CF wants to better understand the consumer behavior of the team's fan base. In the next home game they will survey the people who are attending the game and record their gender, age, and if they are wearing the team's jersey.

- a) Describe how the marketing department could use a ***k-systematic random sampling*** to select 200 fans (out of the estimated 20,000 who are expected to attend the game) to have them complete the survey.
- b) Describe any concerns you may have of ***bias*** with the data collected in part a)

Study #2) A research group at the University of Miami has developed a new approach to anxiety counseling that includes service animals. A number of volunteers who suffer from regular anxiety attacks participate in the study. The subjects are randomly assigned to two groups: one receiving standard counseling and one receiving counseling that incorporates the trained service animals. The frequency and intensity of the anxiety attacks of each individual is recorded for a period of one year.

The study showed some promising results in that service animals helped the participants cope with the anxiety attacks better. Based on that, can we claim that the company of service animals reduces the anxiety levels of any human? Explain.

Study #3) A research team from the U.S. Department of Education is collecting data to compare the PSAT scores of middle-class students who are attending public schools vs. those attending private schools. Describe how the USDoE could use a ***stratified random sampling*** method for this study.

Study #4) The ACT organization wants to see if there is a relationship between high school students GPA and their score in the (standardized) ACT exam. They retrieve data from the last 10 years on the average (self-reported) GPA of the students who took the ACT exam that year and their average ACT score. Provide at least **one source of bias** in this study.

Study #5) A study aimed to explore the relationship between gratitude and well-being among adolescents. More specifically, 221 middle school students participated in this study over a period of two months. The students were randomly assigned to one of the following groups: gratitude, hassles, or control (standard). During the period of the two months the students were asked daily to either list/reflect on few things they are grateful for in the past 24-hours or list/reflect on few things that annoyed them in the past 24-hours, or do nothing. Then the students were asked to rate their current level of satisfaction with school and their optimism for life.

- a) Assuming that the list of the 221 students was the result of an **SRS** from the entire population of middle school students in New York city, what would be the proper population that we can generalize the results of this study to?
- b) What type of **bias** we would be concerned about if we were to generalize the results to all K-12 students in the state of New York? Explain.