

## Chapter 2: Measures of Central Tendency- Mean, Median & Mode

### I. Data Collection

- a. Scores are collected on one or more variables and must be arranged from lowest to highest. This is known as a distribution of scores.
- b. Researchers are interested in measures of central tendency (mean, median, & mode)

### II. The Mean

- a. Definition: The arithmetic average of a distribution of scores
  - b. Most commonly used statistic in all social science research. Provides a single, simple number that gives a rough summary of the distribution.
  - c. How to calculate the mean
    - i. Add all the scores in a distribution and divide by the number of scores.
- OR
- ii. Multiply each value by the frequency for which the value occurred, add all of the products, and divide by the number of scores.

### III. The Median

- a. Definition: The score in a distribution that marks the 50th percentile. It is the score at which 50% of the distribution falls below and 50% fall above.
- b. Used when dividing distribution scores into two groups.
- c. Useful statistic to examine when scores in a distribution are skewed or when there are extremes scores at the high end or the low end of the distribution.
- d. How to find the Median:
  - i. Arrange all of the distribution scores from smallest to largest and find the middle score in the distribution
    1. If there is an ODD number of scores: There will be a single score that marks the middle of the distribution.
    2. If there is an EVEN number of scores in the distribution: The median is the average of the *two* scores in the middle of the distribution.
      - a. Finding the average: Add the two middle scores together and divide by two.
- e. The median is less influenced by extreme scores (i.e., outliers) than is the mean.

### IV. The Mode

- a. Definition: The score in the distribution that occurs most frequently
- b. Provides the least amount of information and is the least used measure of central tendency.

- c. **Multimodal distribution:** When a distribution of scores has two or more values that occur most frequently. Often occurs when people respond to controversial questions that tend to polarize the public.

## V. Skewed Distribution

- a. **Definition:** A distribution of scores has a high number of scores clustered at one end of the distribution with relatively few scores spread out toward the other end of the distribution, forming a tail.
- b. In a skewed distribution, the mean, median, and mode are usually at different points rather than at the center of the distribution.
  - i. The mean is pulled toward the higher values in a positively skewed distribution and toward the lower values in a negatively skewed distribution.
- c. The procedures used to calculate a mean, median, and mode are the same for skewed and non-skewed distributions.
- d. In skewed distributions, the mean is generally pulled toward the tail by the extreme scores, but the median is not.
  - i. For example, a few extremely wealthy people in a sample can pull the sample mean up toward the extreme scores, creating a positively skewed distribution.
    - 1. The median would not be pulled toward the extreme scores.
  - ii. Many argue that the median is a less biased indicator than the mean of the central tendencies for skewed distributions.
- e. Histograms, which are graphs of the frequency distributions of variables, often provide a useful visual cue about whether a distribution is skewed, and in which direction.

## VI. Summary

- a. Measures of central tendency, in particular the mean and the median, are the most commonly used and useful statistics for researchers. In a single number they provide important information about the distribution.
- b. Although useful, they can also be dangerous if we forget that statistics such as the mean and median ignore a lot of information about the distribution, including the great amount of variability that exists in many distributions.
- c. Without considering the variety as well as the average, it becomes easy to make sweeping generalizations, or stereotypes, based on the mean.