

3.3: Median

The **median** is a measure of central tendency that refers to the score that is in the middle of an ordered set of quantitative scores. Essentially, a median is a midpoint of ordered scores. This means that about half of the scores represent values greater than the median and the other half represent values lesser than the median. Therefore, think of the median as representing the dividing line between the upper and lower 50% of scores rather than representing a score that was common, existed in the data, or even could have existed in the data. The median can only be used with data for quantitative variables; qualitative data cannot have a median because qualitative responses cannot be organized in order of magnitude. Just like is true for the mode, a median should only be reported for variables and not for constants. In addition, if the variable is quantitative but discontinuous, medians should be used and interpreted with caution.

When there is an odd number of scores, the number in the middle of the set of scores is the median. To find the median for a data set with an odd sample size, first ensure that you have data for a variable rather than a constant. Then, follow these two steps:

1. Organize the raw scores from smallest value to highest value.
2. Find the number that falls exactly in the middle of those ordered scores. This number is the median.

Where there is an even number of scores, two numbers are in the middle so an extra step is needed to find the median. In these cases, the median is the midpoint *between* the two scores that are on either side of the middle of the ordered scores. To find the median for a data set with an even sample size, first ensure that you have data for a variable rather than a constant. Then, follow these three steps:

1. Organize the raw scores from smallest value to highest value.
2. Find the two numbers that fall on each side of the middle of those ordered scores.
3. Add these two numbers and divide the sum by 2. The resulting number is the median.

The third step allows us to find the midpoint between two scores when that midpoint was not observed in the data.

Data Set 3.3 (Miles Per Hour)

Raw Data	Reordered Data
65	81
77	77
68	77
76	76
81	75
64	72
65	68
77	65
72	65
75	64

Let's take a look at an example using Data Set 3.3. These data represent speeds driven on the freeway in miles per hour. This is quantitative and measured on a ratio scale. The first column shows the data before being organized. The first step is to put the data in order from lowest to highest which is shown in the second column for Data Set 3.3. The sample size is 10. A dashed line is shown in the ordered data column to indicate where the median score would be in the list of scores. Notice that the midpoint falls between two of the scores. Because the sample size is even, we must find the midpoint between the two scores which are closest to the middle. These scores are 75 and 72. Therefore, the midpoint between 75 and 72 is the median and can be computed by summing these values and dividing by 2 as shown:

Median Calculations Using Data Set 3.3

$$Mdn = \frac{75 + 72}{2} = \frac{147}{2} = 73.50$$

There are a variety of symbols and abbreviations that are used for the median which include, for examples, *Mdn*, *Med*, and \tilde{x} . The symbol \tilde{x} is sometimes called x-tilde because it has a tilde over the top of it. Any of these can be used but for this chapter we will use *Mdn* for simplicity. The same symbol is used when reporting the median for a sample as a median for a population.

$$\mathbf{Mdn = 73.50}$$

Look back at Data Set 3.1 for age. There are 22 scores for the variable age. This is an even number of scores which means there is no number exactly in the middle; in a case like this, you find the point between the two middle scores. The two scores in the middle of the list (11th from the top and 11th from the bottom) are 29 and 29. This makes things easy because the midpoint between 29 and 29 is just 29! Following APA guidelines, median is generally reported to the hundredths place; thus, our median would be reported as 29.00. Recall from earlier that the mode for the data in Data Set 3.1 was also 29.00. Thus, we have used two measures of central tendency that have yielded the same summary number for age in dataset 3.1.

Median Calculations Using Data Set 3.1

$$Mdn = \frac{29 + 29}{2} = \frac{58}{2} = 29.00$$

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