What is the difference between Qualitative and Quantitative Variables?

Authored by

stats writer

April 19, 2024

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RECOMMENDED CITATION

stats writer (2024). *What is the difference between Qualitative and Quantitative Variables?*. PSYCHOLOGICAL SCALES. Retrieved from https://scales.arabpsychology.com/?p=137072

Qualitative and quantitative variables are two types of data that are used in research and data analysis. Qualitative variables are descriptive and do not have numerical values, while quantitative variables are numerical and can be measured or counted.

The main difference between the two is that qualitative variables are based on qualities or characteristics, while quantitative variables are based on quantity or numerical values. Qualitative variables are often used to describe and categorize things, such as gender, ethnicity, or occupation. On the other hand, quantitative variables are used to measure and compare data, such as height, weight, or income.

Another key difference is that qualitative variables are often subjective and can be interpreted differently by different individuals, while quantitative variables are more objective and can be measured and compared using statistical methods.

In summary, the main distinction between qualitative and quantitative variables lies in their nature and purpose. Qualitative variables provide descriptive information, while quantitative variables provide numerical data that can be analyzed and used for statistical purposes. Understanding the difference between these two types of variables is crucial in conducting accurate and meaningful research.

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Qualitative vs. Quantitative Variables: What's the Difference?

In statistics, there are two types of variables:

1. Quantitative Variables: Sometimes referred to as "numeric" variables, these are variables that represent a measurable quantity. Examples include:

Number of students in a classNumber of square feet in a housePopulation size of a cityAge of an individualHeight of an individual

2. Qualitative Variables: Sometimes referred to as "categorical" variables, these are variables that take on names or labels and can fit into categories. Examples include:

Eye color (e.g. "blue", "green", "brown")Gender (e.g. "male", "female")Breed of dog (e.g. "lab", "bulldog", "poodle")Level of education (e.g. "high school", "Associate's degree", "Bachelor's degree")Marital status (e.g. "married", "single", "divorced")

	Quantitative Variables	Qualitative Variables
Definition	*Take on numeric values*	*Take on names or labels*
Examples	Number of students in a class	Eye color
	Number of square feet in a house	Gender
	Population size of a city	Breed of dog
	Age of an individual	Level of Education
	Height of an individual	Marital status

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Every single variable you will ever encounter in statistics can be classified as either quantitative or qualitative.

Example: Classifying Quantitative & Qualitative Variables

Consider the following dataset with information about 10 different basketball players:

Player Name	Position	Seasons Played	Avg. Points	Championships
Mike	G	12	22.1	3
Chuck	G	9	26.6	2
Tony	F	8	16.5	2
Andy	F	8	17.7	0
Karl	C	14	24.4	1
John	G	12	29.8	2
Klay	F	16	17.2	2
Dirk	F	15	14.4	4
Mark	G	9	9.8	3
Kenny	C	12	20.1	3

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There are five total variables in this dataset. Two of them are qualitative variables and three of them are quantitative variables:

Variable Type:	Qualitative	Qualitative	Quantitative	Quantitative	Quantitative
Player Name	Position	Seasons Played	Avg. Points	Championships
Mike	G	12	22.1	3
Chuck	G	9	26.6	2
Tony	F	8	16.5	2
Andy	F	8	17.7	0
Karl	C	14	24.4	1
John	G	12	29.8	2
Klay	F	16	17.2	2
Dirk	F	15	14.4	4
Mark	G	9	9.8	3
Kenny	C	12	20.1	3

Summarizing Quantitative & Qualitative Variables

We can use many different metrics to summarize quantitative variables, including:

Measures of central tendency like the mean, median, and mode.Measures of dispersion like the range, interquartile range, and standard deviation.

However, we can only use frequency tables and relative frequency tables to summarize qualitative variables.

To illustrate this, let's once again consider the dataset from the previous example:

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Variable Type:	Qualitative	Qualitative	Quantitative	Quantitative	Quantitative
Player Name	**Position**	**Seasons Played**	**Avg. Points**	**Championships**
Mike	G	12	22.1	3
Chuck	G	9	26.6	2
Tony	F	8	16.5	2
Andy	F	8	17.7	0
Karl	C	14	24.4	1
John	G	12	29.8	2
Klay	F	16	17.2	2
Dirk	F	15	14.4	4
Mark	G	9	9.8	3
Kenny	C	12	20.1	3

For the quantiative variable *Seasons Played*, we can calculate the following metrics:

Mean: 11.5Median: 12Mode: 12Range: 8Interquartile Range: 4.5Standard Deviation: 2.915

These metrics give us a good idea of where the center value is located as well as how spread out the values are for this variable.

And for the qualitative variable *Position*, we can create a frequency table to describe how often different values occur:

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Position	Frequency
G	4
F	4
C	2

This table lets us quickly see how frequently each position (G=guard, F=forward, C=center) occurred in the dataset.

Descriptive vs. Inferential Statistics

Statistic vs. Parameter

Levels of Measurement: Nominal, Ordinal, Interval and Ratio

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