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Descriptive Statistics: Types, Examples and How to Report Them

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Abstract

Descriptive statistics are the first numbers in almost every quantitative results section, and they are often treated as a formality. A mean reported for skewed data, or a summary that hides an error in the data set, can mislead a reader before any test has been run. This article sets out the four types of descriptive statistics: frequencies and percentages, measures of central tendency, measures of dispersion, and measures of shape. It works through every common measure (mean, median, mode, range, interquartile range, variance, standard deviation and skewness) on one small illustrative data set and compares it with a second, more tightly grouped set. It explains why descriptive statistics matter before any inferential test, matches the measures of center and spread to the level of measurement and shape of the data, and summarizes the main APA Style conventions for reporting them. Extracts from two doctoral studies show how counts, percentages, means and standard deviations are reported and interpreted. It is intended for students and early-career researchers, and for the educators who teach research methods and statistics.

Keywords: descriptive statistics; types of descriptive statistics; descriptive statistics examples; how to report descriptive statistics; measures of central tendency; measures of dispersion; skewness; open educational resource

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1. Introduction

Descriptive statistics appear to be the simplest part of a quantitative analysis, and for that reason they are often rushed. The shortcut has a cost. A mean reported for skewed data, or a summary that conceals a problem in the data set, misleads the reader of a thesis or research report before a single inferential test has been run. The descriptive results are frequently where errors first appear in a results section.

This article is written for students and researchers preparing that analysis and for those who teach it. Section 2 defines descriptive statistics and distinguishes them from inferential statistics. Section 3 explains why they matter for the rest of an analysis. Section 4 introduces the four types of descriptive statistics, beginning with frequencies and percentages. Sections 5 and 6 work through the measures of central tendency, shape and dispersion on one small illustrative data set. Section 7 sets out which measures to report for different kinds of data, and Section 8 shows how to report them, with extracts from two doctoral studies as models.

2. What Descriptive Statistics Are

A descriptive statistic is **a single number that represents many values**: one figure that captures what a typical value looks like, how spread out the values are, or what shape they take. Descriptive statistics summarize the basic features of the data in a study (Mishra et al., 2019), so that a sample can be understood without reading every raw response, whether there are 15 responses or 15,000.

Some descriptive statistics are as simple as a count. The number of men and women in a sample, or the percentage of respondents in each age group, are descriptive statistics. So is the arithmetic average, which statisticians call the mean. If 200 people rated a product from 1 to 10, the mean rating would summarize all 200 answers in a single number.

Descriptive statistics do not reach beyond the data. They describe the people or things that were actually measured, and nothing more. That limit separates them from the other main branch of statistics. **Inferential statistics** use a sample to draw conclusions about a wider population (Guetterman, 2019). Descriptive statistics show that the 200 people in a survey rated a product 6.4 on average; inferential statistics are used to estimate the average rating among customers in general, or to test whether two groups really differ.

A quantitative study needs descriptive statistics whether or not it also uses inferential statistics, and they come first in the results. Descriptive statistics alone are sometimes an appropriate stopping point (Guetterman, 2019), typically when the research questions are themselves descriptive. A question such as “What proportion of nurses on this unit have completed the training?” is answered completely by counts and percentages. A question that asks whether groups differ or whether variables are related needs inferential statistics as well. Programs differ in what they expect of a quantitative thesis, so the program’s requirements are worth checking before the analysis is planned.

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3. Why Descriptive Statistics Matter

Descriptive statistics are simple mathematically, but the rest of an analysis depends on three things they do:

1. **They describe the sample** before anything is tested: who responded, what a typical answer was and how much the answers varied. In a quantitative study they also supply the first table of results, which reports information about the sample (Guetterman, 2019).
2. **They expose problems in the data**, such as missing responses, suspicious outliers or impossible values. Frequencies, minimums and maximums reveal values outside the accepted range (Guetterman, 2019): a rating of 11 on a 1-to-10 scale is a data entry error, not a finding. Identifying an outlier does not by itself justify deleting it, however; deciding what to do with one is a separate judgment.
3. **They show the shape of the data**, which bears on which inferential tests are appropriate. Many common tests assume approximately normal data, and when that assumption is badly violated, particularly in small samples, nonparametric methods are a common alternative (Mishra et al., 2019).

It is tempting to treat descriptive statistics as a preliminary step and move quickly to the inferential tests. Guetterman (2019) places them first for good reason: they show whether the data are ready for analysis and whether the assumptions of the planned tests are met. A t-test run on badly skewed data from a small sample, or on a data set with an undetected entry error, gives a result that an examiner or reviewer can undermine with a single question.

4. Types of Descriptive Statistics

Descriptive statistics fall into a small number of types, each answering a different question about the data. Mishra et al. (2019) group them into three: measures of frequency, measures of central tendency and measures of dispersion. This article adds a fourth type, shape, which covers skewness and kurtosis (Figure 1). A thorough description of a data set can draw on all four types.

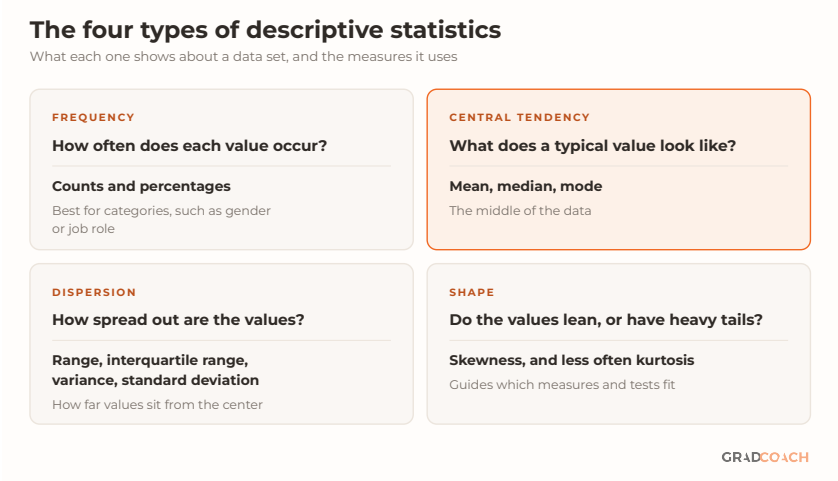


Figure 1. The four types of descriptive statistics, the question each answers and its measures.

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4.1 Frequencies and percentages

A frequency is **a count of how often each value occurs**, and a percentage expresses that count as a proportion of the whole sample. Frequencies are usually used for categorical data (Mishra et al., 2019), such as gender, language or job role, where an average would be meaningless.

The following extract is from a Doctor of Nursing Practice project at the University of Massachusetts Amherst, which tested a nurse-led intervention on a hospital unit. It describes the patients in its first data collection period:

> There were 440 patient records in the pre-intervention group of whom 232 (53%) were female and 208 (47%) were male. Three hundred and ninety-three (89%) spoke English and 47 (11%) were non-English speakers.
>
> Baldassari (2026, p. 17)

The extract follows a clear pattern: **the count is given first, followed by the percentage in parentheses**, with the total stated at the outset so that every percentage has a base. The percentages make it possible to compare groups of different sizes, which the project goes on to do with a second group of 312 records. Categorical variables are best described in the same way, with the number of people or records behind each figure (n) given alongside the percentage. In APA Style, a capital N denotes the whole sample and a lowercase n a subgroup of it (Purdue Online Writing Lab, n.d.-b).

5. Measures of Central Tendency and Shape

Measures of central tendency describe **the center of a data set**: the value that represents a typical data point (Mishra et al., 2019). The three most common are the following:

1. **Mean:** the sum of the values divided by the number of values; what most people mean by "the average".
2. **Median:** the middle value once the values are sorted from lowest to highest. When there is an even number of values, the median lies halfway between the two middle values.
3. **Mode:** the value that occurs most often. A data set can have one mode, several, or none at all (Mishra et al., 2019).

Each measure captures a "typical" value in a different way, so they do not always agree, and comparing the three is informative in itself.

A small illustrative data set makes this concrete. Fifteen customers rated a business's service on a scale of 1 to 10. Their ratings, in the order received, were 3, 5, 6, 10, 5, 5, 9, 6, 8, 4, 6, 7, 4, 2 and 7. Because this is a single rating item, a write-up would lead with the median (Section 7); the mean and standard deviation are calculated here because their arithmetic is easiest to follow on a small set. Table 1 gives the measures of central tendency, with the Microsoft Excel function that calculates each.

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Table 1. Measures of central tendency for the 15 ratings, with the Excel function for each.

Statistic	Result	Excel function
Mean	5.8	=AVERAGE
Median	6	=MEDIAN
Mode	5 and 6	=MODE.MULT

The mean of 5.8 is the sum of the ratings (87) divided by the 15 customers. For the median, the ratings are sorted (2, 3, 4, 4, 5, 5, 5, 6, 6, 6, 7, 7, 8, 9, 10) and the eighth value, 6, is taken. There are **two modes**, because 5 and 6 each occur three times. The data are therefore bimodal, which is a reason to use Excel's MODE.MULT function rather than MODE, which returns only one value.

Together, the three measures agree: a typical customer rated the service a moderate 5 or 6. The mean and median lie close together, which suggests that the ratings are roughly balanced around the middle.

That balance can be checked by counting how many times each rating was given. These counts are called a **frequency distribution**, and Figure 2 plots them as a bar chart.

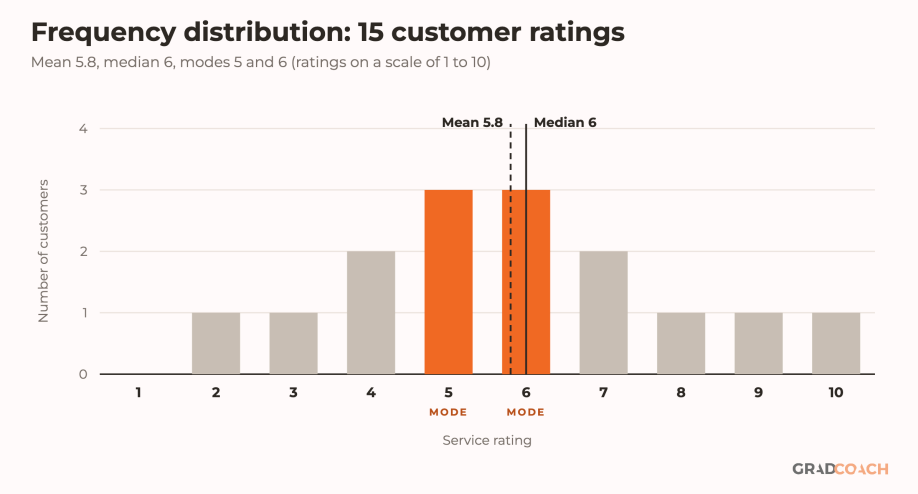


Figure 2. Frequency distribution of the 15 ratings; the modes are the two tallest bars.

The ratings cluster in the middle and thin out toward both ends, somewhat like a bell. With only 15 values, however, this is not evidence of a normal distribution. A small sample can look bell-shaped by chance, and with so few values even the skewness statistic, discussed next, is only a rough guide (Mishra et al., 2019).

5.1 Skewness and kurtosis

Many data sets are not balanced at all. The values can lean toward the low or the high end, and that lean is called **skewness**: a measure of the lack of symmetry of a distribution (Mishra et al., 2019). It matters for two reasons. Skewness changes which measure of center describes the data honestly, and it affects the choice of tests.

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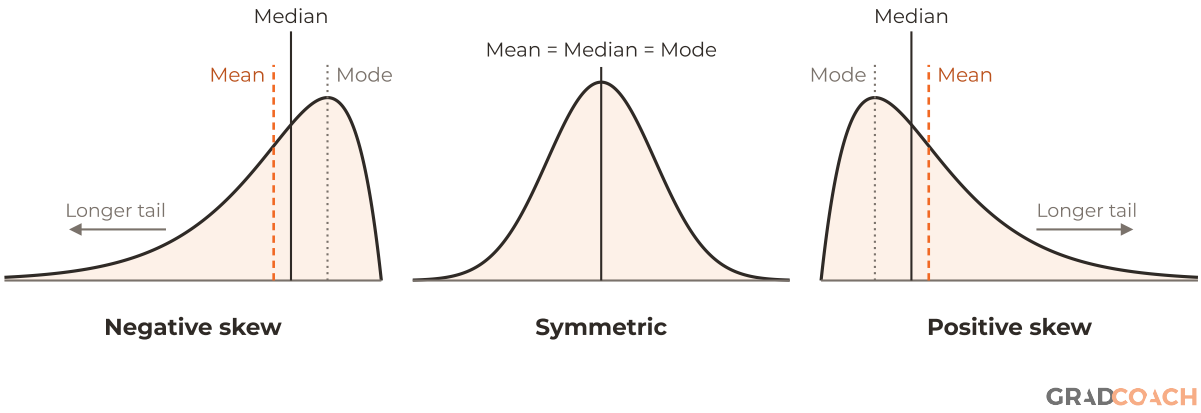


Figure 3. The textbook positions of the mean, median and mode under skew. From Jansen (2026), CC BY 4.0.

Skewness is named after the tail, not the peak. **Positive skew** has a long tail toward the high values, and **negative skew** a long tail toward the low values. Figure 3 shows the textbook rule that goes with these shapes: the mean is pulled toward the tail, above the median under positive skew and below it under negative skew. This rule is only a rule of thumb. It fails surprisingly often, most commonly in discrete distributions (data that take only separate values, such as whole-number ratings). In such data, several values can equal the median, which leaves unequal numbers of values on either side of it (von Hippel, 2005). A plot of the data says more about their shape than the gap between the mean and median does.

The customer ratings illustrate the point. Their skewness is 0.25 (Excel's =SKEW), a slight lean toward the high end. Yet their mean (5.8) lies just below their median (6), which is the opposite of what the rule predicts. The reason is the tied values: seven ratings fall below the median of 6, three equal it and only five lie above it. Both the gap between mean and median and the skewness are small, however. With only 15 values, the standard error of the skewness (an estimate of how much the statistic would vary from one sample to another) is about 0.58 (Mishra et al., 2019, report the same value for their 15 observations). Because a skewness of 0.25 is less than half its standard error, it is consistent with roughly symmetrical data.

Software output often reports **kurtosis** beside skewness. Kurtosis is often described as the peakedness of a distribution, but that description is mistaken. Its only unambiguous interpretation concerns the extremity of the tails: the presence of extreme values in a sample, or a distribution's tendency to produce them (Westfall, 2014). In a write-up it is usually mentioned only when it is extreme.

6. Measures of Dispersion

Measures of central tendency locate the middle of the data. **Measures of dispersion show how tightly the data cluster around it**, or how far they scatter. Two data sets can have similar centers but look nothing alike. The four most common measures are the following:

1. **Range:** the highest value minus the lowest (Mishra et al., 2019). It is quick to calculate, but a single extreme value can stretch it.

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2. **Interquartile range (IQR):** the spread of the middle half of the data, from the 25th percentile to the 75th (Mishra et al., 2019). Because the interquartile range ignores the extremes, it is the natural partner for the median.
3. **Variance:** the average squared distance of each value from the mean (Mishra et al., 2019). When a sample is used to estimate the population's spread, which is the usual case, software divides the sum of squared distances by one less than the number of values, as Excel's VAR.S does, so a sample variance is slightly larger than a strict average. A larger variance means more spread, but because it is in squared units it is hard to read directly.
4. **Standard deviation (SD):** the square root of the variance, which returns it to the original units. It can be read loosely as a typical distance between the individual values and the mean (Mishra et al., 2019), and it is the measure most often reported alongside the mean. However, the standard deviation is always at least as large as the average absolute distance from the mean. On average, the customer ratings in Section 5 lie 1.68 points from their mean, while their standard deviation is 2.18.

Dispersion is easiest to understand by comparison. A second illustrative set of 15 ratings comes from a business whose customers largely agreed with one another: one 5, five 6s, six 7s and three 8s. Table 2 compares the two sets.

Table 2. Descriptive statistics for the two sets of 15 ratings, with the Excel function for each.

Statistic	First business	Second business	Excel function
Mean	5.8	6.7	=AVERAGE
Median	6	7	=MEDIAN
Range	8 (2 to 10)	3 (5 to 8)	=MAX minus =MIN
Interquartile range	3	1	=QUARTILE.EXC (Q3 minus Q1)
Variance	4.74	0.78	=VAR.S
Standard deviation	2.18	0.88	=STDEV.S
Skewness	0.25	−0.12	=SKEW

Table 2 shows working values to two decimal places; in a report they would be rounded as Section 8 describes (for example, 2.18 becomes 2.2). Software packages also calculate quartiles in different ways. For the first business, QUARTILE.EXC places the quartiles at 4 and 7, an IQR of 3, while QUARTILE.INC gives 4.5 and 7, an IQR of 2.5. Where the exact IQR matters, the calculation method used should be named. Figure 4 shows the second business's distribution.

Every measure of dispersion agrees. The first business's ratings are widely spread, with a range of 8 and a **standard deviation of 2.18**. The second business's ratings are tightly grouped, with a standard deviation under 1. The second set's skewness of −0.12 is a very slight lean toward the low end, close enough to zero to treat the distribution as symmetrical.

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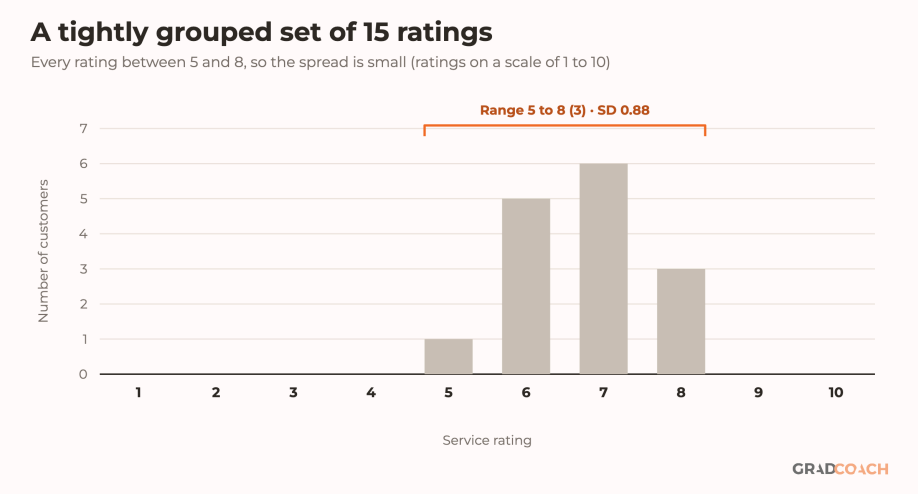


Figure 4. Frequency distribution of the second set of 15 ratings, all between 5 and 8.

In normally distributed data, about 68% of values lie within one standard deviation of the mean (Mishra et al., 2019), roughly two-thirds. For the first business, that band runs from 3.62 to just under 8 (7.98), and 10 of the 15 ratings (67%) fall within it. The rating of 8 lies just outside it, and the rating of 3 a little further below. With 15 ordinal ratings, that close match to 68% is a coincidence rather than a test of normality.

The standard deviation of 2.18 can also be calculated by hand: square each rating's distance from the mean of 5.8, add the squared distances together (66.4), divide by 14 (one less than the 15 values) to obtain the variance (4.74), and take the square root.

The comparison shows why **a center should never be reported without a spread**. A mean of 5.8 with a standard deviation of 2.2 describes customers who disagree considerably, and the "typical" rating conceals that disagreement. A mean of 6.7 with a standard deviation of 0.9 describes customers who largely agree, so the mean genuinely represents them.

7. Choosing Which Statistics to Report

Which measures to report depends on the data, mainly on their level of measurement and their shape. The Purdue Online Writing Lab (n.d.-a) sets the baseline rule: present at least one measure of central tendency and one of variability, usually the standard deviation. The choice of pair follows from the kind of data (Table 3).

Table 3. The measures of center and spread usually reported for each kind of data.

Data	Center	Spread
Numerical (interval or ratio) and roughly symmetrical	Mean	Standard deviation
Numerical but skewed, or with outliers	Median	Interquartile range
A single rating or Likert-type item (ordinal)	Median or mode	Frequencies, or the interquartile range
Categories (nominal)	Mode	Counts and percentages

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The mean is the default for numerical data, but it is **affected by extreme values**, while the median is not (Mishra et al., 2019). When data are markedly skewed or contain outliers, the mean no longer represents a typical value well, and Mishra et al. (2019) note that the median and nonparametric methods are then the usual choice. Income is the classic case: a few very high earners pull the mean up, so the median better describes a typical person.

The third row of Table 3 needs explanation, because rating scales are a common source of error. Strictly, a single rating item is ordinal data: the gap between "agree" and "strongly agree" is not a measured distance. Boone and Boone (2012) accordingly recommend the median or mode and frequencies for single Likert-type items, and reserve the mean and standard deviation for Likert scales, composite scores built by combining several items. Whether even composite scores may be treated as interval data is itself debated.

A single-item variable should therefore be analyzed further with ordinal methods, as well as described with those statistics. A single 1-to-10 rating is most safely treated the same way. Some researchers treat rating items with many points as interval data, but this practice is contested and should be justified where it is used. The customer ratings in Sections 5 and 6 are exactly such single ratings; they were used to show how the mean and standard deviation work, and the example write-up in Section 8 reports them as Table 3 recommends.

8. Reporting Descriptive Statistics

In a thesis or research report, descriptive statistics appear near the start of the results and before any inferential tests (Guetterman, 2019). The results usually begin with the sample's demographics, although some departments place these in the methodology chapter instead. APA Style is widely used in the social sciences, education and nursing. Only a few of its rules apply here, and all are set out in its numbers and statistics guide (American Psychological Association, 2024):

1. **Use the symbol when it is followed by a mathematical operator** such as an equals sign ($M = 3.9$, $SD = 0.9$), and the word itself in running text ("the mean rating was …"). Statistical symbols such as M, SD and N are italicized and need no definition.
2. **Round sensibly.** Means and standard deviations for data measured on integer scales, such as surveys and questionnaires, are reported to one decimal place.
3. **Do not repeat statistics in both the text and a table.** In practice, the text should point to the table and state what the key figures show, rather than copying every mean and standard deviation into the prose.

Universities and departments may follow a different style guide, so the relevant handbook should be checked first; the principles carry over even where the details differ.

Applied to the first business, whose ratings came from a single item, a write-up could read as shown in Box 1.

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Box 1. An example write-up of the first business's ratings, written for this article.

> The 15 customers gave the service a median rating of 6 out of 10, and the most common ratings were 5 and 6 (three customers each). Ten of the 15 ratings fell between 4 and 7, with the rest spread from 2 to 10, suggesting that most customers held a moderate view of the service while a few rated it noticeably lower or higher.

The example reports a center (the median) and a spread (how the ratings are distributed), and **ends on what the numbers mean** rather than leaving the reader to work it out. For a scale score built from several items, the same sentence would report the mean (M) and standard deviation (SD) instead, each to one decimal place.

Published studies follow the same shape, even with very different data. The following extract is from a doctoral thesis in finance from the University of Lincoln, a study of banks in sub-Saharan Africa. It introduces its table of summary statistics and then discusses the key variables. The thesis follows its own conventions (it writes "mean =" where APA would use an italic M), so the extract is a model for structure rather than symbols:

> Table 2 [in the original] summarizes the descriptive statistics of the main variables. The dependent variable, ΔLeverage, is tightly centered around zero (mean = 0.001) with moderate dispersion (SD = 0.119), indicating limited average changes but meaningful cross-banking sector variation.
>
> Kasonde (2026, p. 125)

In a single sentence about its main variable, the passage names **the measure of center (the mean), the measure of spread (the standard deviation) and what both mean** for the study. In the following paragraph it does the same for shape, describing one set of variables as "strongly right-skewed, reflecting infrequent but occasionally large adjustments" (Kasonde, 2026, p. 125).

The table holds every number, while the prose identifies which ones matter. A results section can follow the same approach: point to the table, select the few figures that answer the research questions, and state in plain words what each one shows.

9. Conclusion

Descriptive statistics summarize the data that were collected. They describe the sample and cannot, on their own, support conclusions about a wider population. They fall into four types: frequencies and percentages for categories; measures of central tendency, such as the mean, median and mode; measures of dispersion, such as the range, interquartile range, variance and standard deviation; and measures of shape, chiefly skewness. A measure of center should always be reported with a measure of spread, matched to the level of measurement and shape of the data: the mean and standard deviation for roughly symmetrical numerical data, the median and interquartile range for skewed data, and the median and frequencies for a single rating item. Because the shape of the data influences which inferential tests are appropriate, the descriptive statistics should be examined before any test is run. Each statistic is best reported in APA form (the symbol beside a mathematical operator, the word in running text), to a sensible number of decimal places, followed by a plain statement of what it means.

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References

American Psychological Association. (2024). *APA Style numbers and statistics guide*. https://apastyle.apa.org/instructional-aids/numbers-statistics-guide.pdf

Baldassari, J. (2026). *Improving health care proxy procurement rates for hospitalized adults: A nurse led intervention* [Doctor of Nursing Practice project, University of Massachusetts Amherst]. ScholarWorks@UMass Amherst. https://doi.org/10.7275/10651

Boone, H. N., Jr., & Boone, D. A. (2012). Analyzing Likert data. *Journal of Extension*, 50(2), Article 48. https://doi.org/10.34068/joe.50.02.48

Guetterman, T. C. (2019). Basics of statistics for primary care research. *Family Medicine and Community Health*, 7(2), Article e000067. https://doi.org/10.1136/fmch-2018-000067

Jansen, D. (2026). *Mean, median and mode in skewed and symmetric distributions* [Figure]. Grad Coach. https://gradcoach.com/open-educational-resources/mean-median-mode-skewed-distribution-diagram/

Kasonde, R. (2026). *Essays on the Basel III leverage ratio: Leverage procyclicality, bank risk, and liquidity creation in sub-Saharan Africa* [Doctoral thesis, University of Lincoln]. University of Lincoln Repository. https://doi.org/10.24385/lincoln.33113078

Mishra, P., Pandey, C. M., Singh, U., Gupta, A., Sahu, C., & Keshri, A. (2019). Descriptive statistics and normality tests for statistical data. *Annals of Cardiac Anaesthesia*, 22(1), 67–72. https://doi.org/10.4103/aca.ACA_157_18

Purdue Online Writing Lab. (n.d.-a). *Descriptive statistics*. Purdue University. Retrieved November 12, 2026, from https://owl.purdue.edu/owl/research_and_citation/using_research/writing_with_statistics/descriptive_statistics.html

Purdue Online Writing Lab. (n.d.-b). *Numbers & statistics*. Purdue University. Retrieved November 12, 2026, from https://owl.purdue.edu/owl/research_and_citation/apa_style/apa_formatting_and_style_guide/apa_numbers_statistics.html

von Hippel, P. T. (2005). Mean, median, and skew: Correcting a textbook rule. *Journal of Statistics Education*, 13(2). https://doi.org/10.1080/10691898.2005.11910556

Westfall, P. H. (2014). Kurtosis as peakedness, 1905–2014. R.I.P. *The American Statistician*, 68(3), 191–195. https://doi.org/10.1080/00031305.2014.917055

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