**Comparing Hours Exercise per Week across Gender**

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**Introduction**

Exercise is important for physical, mental, and emotional health and well-being and for happiness and ease of learning. In this paper, statistics relating to by-gender datasets of number of hours exercise per week are compared. Each dataset corresponds to a small by-gender sample of individuals. This paper provides context and motivation for conducting studies with the following research questions.

* How do by-gender datasets of number of hours exercise per week compare for the by-gender populations of
  + Students at Piedmont Virginia Community College (PVCC)?
  + Citizens of Charlottesville?
  + Students at universities with a quality of life above a certain threshold?
  + Citizens of the United States?
  + Citizens of countries with a quality of life above a certain threshold?
* Are differences in by-gender datasets statistically significant?
* Are there differences in characteristics of exercise (e.g., type, intensity)?
* How would differences in characteristics of exercise be accounted for?
* Is it ideal for characteristics of exercise to be the same?
* Do differences in by-gender datasets reflect societal norms?
* Is it ideal for statistics that are significantly different to be the same?

**Samples and Datasets**

In this paper, statistics relating to by-gender datasets of number of hours exercise per week are compared. Each dataset corresponds to one of three by-gender samples. One sample is a group of 38 individuals who self-identify as female. One sample is a group of 27 individuals who self-identify as male. One sample is a group of 1 individual who self-identifies as non-binary.

Collection of the quantitative data in the by-gender datasets was managed by Dr. Irina Timchenko, Ph.D., a Lecturer at PVCC. Dr. Timchenko selected by convenience two all-gender clusters of students (i.e., two sections of Statistics-I students) from a much larger all-gender population (e.g., students at PVCC or citizens of countries with a quality of life above a certain threshold). Dr. Timchenko requested that each student complete a survey by filling out one row of personal data in a Google Sheet corresponding to the student’s section. Students voluntarily completed the survey; surveys were completed at students’ conveniences. Surveys were completed anonymously. Students’ survey answers may have been affected by students reading responses of other students; only the first student to complete a survey in each section completed the survey blindly. Dr. Timchenko combined the rows in each Google Sheet and performed data cleaning (e.g., by substituting a for a ).

Organization of collected data into the by-gender datasets was managed by Mr. Thomas Lever, the author of this paper. Mr. Lever extracted the Gender column of qualitative, categorical, nominal data and the Hours Exercise per Week column of quantitative, continuous, ratio data from Dr. Timchenko’s combined Google Sheet. Mr. Lever changed the nominal values , , and in the Gender column to (male), (female), and (non-binary). Mr. Lever sorted the extracted data first by gender (in alphabetical order) and then by Hours Exercise per Week (in ascending order). Mr. Lever extracted hours exercise per week data corresponding to each gender to a by-gender dataset with outliers and a by-gender dataset without outliers. The three by-gender datasets with outliers are shown below. Summary statistics are shown for all by-gender datasets.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  | | --- | --- | --- | --- | | **Hours Exercise per Week** | | | | |  | **F (h)** | **M (h)** | **NB (h)** | | **1** | 0 | 0 | 10 | | **2** | 0 | 0 |  | | **3** | 0 | 0 |  | | **4** | 0 | 0 |  | | **5** | 0 | 0 |  | | **6** | 0 | 1 |  | | **7** | 1 | 2 |  | | **8** | 1 | 2 |  | | **9** | 2 | 2 |  | | **10** | 2 | 2 |  | | **11** | 2 | 3 |  | | **12** | 2 | 3 |  | | **13** | 2 | 3 |  | | **14** | 3 | 4 |  | | **15** | 3 | 4 |  | | **16** | 3 | 5 |  | | **17** | 3 | 5 |  | | **18** | 3 | 6 |  | | **19** | 4 | 6 |  | | **20** | 4 | 7 |  | | **21** | 4 | 7 |  | | **22** | 4 | 7 |  | | **23** | 5 | 7 |  | | **24** | 5 | 7 |  | | **25** | 5 | 8 |  | | **26** | 5 | 10 |  | | **27** | 5 | 15 |  | | **28** | 5 |  |  | | **29** | 5 |  |  | | **30** | 5 |  |  | | **31** | 5 |  |  | | **32** | 6 |  |  | | **33** | 7 |  |  | | **34** | 8 |  |  | | **35** | 10 |  |  | | **36** | 10 |  |  | | **37** | 10 |  |  | | **38** | 30 |  |  | | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | **Summary Statistics** | | | | | | | | **with Outliers** | | | | **without Outliers** | | | |  | **F** | **M** | **NB** | **F** | **M** | **NB** | | **Acronym**  **(unitless)** | FOY | MOY | NOY | FON | MON | NON | | **n**  **(unitless)** | 38 | 27 | 1 | 34 | 26 | 1 | | **Min** | 0 | 0 | 10 | 0 | 0 | 10 | | **Q1** | 2 | 2 | 10 | 2 | 2 | 10 | | **Median** | 4.0 | 4 | 10 | 3.0 | 3.5 | 10 | | **Q3** | 5 | 7 | 10 | 5 | 7 | 10 | | **Max** | 30 | 15 | 10 | 8 | 10 | 10 | | **IQR** | 3.0 | 5.0 | 0.0 | 3.0 | 5.0 | 0.0 | | **1.5 IQR** | 4.5 | 7.5 | 0.0 |  |  |  | | **Lower Fence** | -2.5 | -5.5 | 10.0 |  |  |  | | **Upper Fence** | 9.5 | 14.5 | 10.0 |  |  |  | | **Outlier Indices (unitless)** | 35, 36, 37, 38 | 27 | ––––– |  |  |  | | **Mean** | 4.4 | 4.3 | 10.0 | 3.2 | 3.9 | 10.0 | | **Mode(s)** | 5 | 0, 7 | ––––– | 5 | 0, 7 | ––––– | | **Range** | 30.0 | 15.0 | 0.0 | 8.0 | 10.0 | 0.0 | | **Standard**  **Deviation** | 5.1 | 3.6 | ––––– | 2.2 | 2.9 | ––––– | | **Variance**  **(h2)** | 25.8 | 12.8 | ––––– | 4.7 | 8.6 | ––––– | | **Skewness**  **(unitless)** | 3.3 | 0.9 | ––––– | 0.0 | 0.2 | ––––– |   Values are in hours unless otherwise noted.  Whole numbers are chosen.  Numbers with decimals are calculated. |

**Comparisons of Measures of Center**

According to Dr. Timchenko, a measure of center is a value that represents the center or middle of a dataset. Measures of center include arithmetic mean, median, and mode.

*Arithmetic Mean*

The arithmetic mean (mean) of a quantitative dataset

where is the number of data in the dataset and represents the th datum in the dataset. The means of the by-gender datasets are

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Mean** | | | | | |
| **with Outliers** | | | **without Outliers** | | |
| **F (h)** | **M (h)** | **NB (h)** | **F (h)** | **M (h)** | **NB (h)** |
| 4.4 | 4.3 | 10.0 | 3.2 | 3.9 | 10.0 |

The greatest mean of a by-gender dataset is equal to the mean of the dataset with outliers corresponding to the sample of non-binary individuals (the NOY dataset) and the mean of the dataset without outliers corresponding to the sample of non-binary individuals (the NON dataset). It seems unreasonable that useful statistics can be drawn from a sample with 1 individual. *The NOY and NON datasets will not be discussed further until the Summary.*

For by-gender datasets with outliers, the mean of the dataset corresponding to the sample of female individuals (the FOY dataset) is greater than the mean of the dataset corresponding to the sample of male individuals (the MOY dataset).

The mean corresponding to a dataset is sensitive to every datum in the dataset, so one exceptional value can affect the mean dramatically. According to Dr. Timchenko, if the dataset has outliers, the median corresponding to that dataset is a more appropriate measure of center than the mean. Both the FOY dataset and the MOY dataset have outliers; the medians of the FOY dataset and the MOY dataset are more appropriate measures of center for those datasets than the means.

For by-gender datasets without outliers, the mean of the dataset corresponding to the sample of male individuals (the MON dataset) is 1.2 times the mean of the dataset corresponding to the sample of female individuals (the FON dataset). This fact is consistent with the fact that the median of the MON dataset is greater than the median of the FON dataset. According to Laerd [1], the mean is the most appropriate measure of center for a quantitative dataset if the dataset does not contain outliers and the dataset is not skewed, and the median is the most appropriate measure of center for a quantitative dataset if the dataset contains outliers or if the dataset is skewed. Given that the by-gender datasets are skewed, the median is the best measure of center of the by-gender datasets. If the by-gender datasets were not skewed, it were ideal to draw conclusions from the by-gender datasets without outliers, and the by-gender samples represented larger by-gender populations, then it would be reasonable to say that male individuals on average exercise for 1.2 times as many hours per week as female individuals.

*Median*

If the number of data in an ascending-ordered quantitative dataset is odd, then the median of the dataset is the middle number of the dataset. If the number of data in the dataset is even, then the median corresponding to the dataset is the mean of the two middle numbers of the dataset. The medians of the by-gender datasets are

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Median** | | | | | |
| **with Outliers** | | | **without Outliers** | | |
| **F (h)** | **M (h)** | **NB (h)** | **F (h)** | **M (h)** | **NB (h)** |
| 4.0 | 4 | 10 | 3.0 | 3.5 | 10 |

Given the by-gender datasets with outliers, the median of the FOY dataset and the median of the MOY dataset are identical. According to Laerd [1], the median is the most appropriate measure of center for a quantitative dataset if the dataset contains outliers. Given that the FOY dataset and the MOY dataset both contain outliers, the medians of these datasets are the most appropriate measures of center for these datasets. Because the medians of these datasets are identical and are the most appropriate measures of center for these datasets, these datasets have more or less the same center.

Given the by-gender datasets without outliers, the median of the MON dataset is greater than the median of the FON dataset. The fact that the median of the MON dataset is greater than the median of the FON dataset is consist with the fact that the mean of the MON dataset is greater than the mean of the FON dataset. According to Laerd, the median is the most appropriate measure of center for a quantitative dataset if the dataset is skewed. Given that the by-gender datasets are skewed, the median is the best measure of center.

*Mode*

The mode(s) of a dataset is/are the most frequently occurring datum/data. The modes of the three by-gender datasets are

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Mode** | | | | | |
| **with Outliers** | | | **without Outliers** | | |
| **F (h)** | **M (h)** | **NB (h)** | **F (h)** | **M (h)** | **NB (h)** |
| 5 | 0, 7 | 10 | 5 | 0, 7 | 10 |

The mode for the FOY dataset is equal to the mode for the FON dataset; the modes for the MOY dataset are equal to the modes for the MON dataset. These modes correspond to peaks in the roughly W-shaped histograms for the FOY and MOY datasets, presented below. For all by-gender datasets, one mode is within one standard deviation of the mean. For the by-gender datasets without outliers, the fact that the mode closest to the standard deviation of the MON dataset is higher than the mode of the FON dataset is consistent with the fact that the mean of the MON dataset is higher than the mean of the FON dataset. According to Laerd [1], the mode is the most appropriate measure of center for a dataset when the dataset contains nominal data. However, for quantitative, continuous, ratio by-gender datasets that have outliers or are skewed, the medians are the most appropriate measures of center.

**Comparisons of Measures of Spread**

According to Dr. Timchenko, a measure of spread is a value that describes the degree to which a dataset is spread-out. Measures of spread include range, standard deviation, and variance.

*Range*

The range of a quantitative dataset is the difference between the maximum and minimum data in the dataset. The ranges of the quantitative data in the three by-gender datasets are

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Mode** | | | | | |
| **with Outliers** | | | **without Outliers** | | |
| **F (h)** | **M (h)** | **NB (h)** | **F (h)** | **M (h)** | **NB (h)** |
| 30.0 | 15.0 | 0.0 | 8.0 | 10.0 | 0.0 |

According to Dr. Timchenko, ranges are unreliable measures of spread because they do not take into consideration every datum in the corresponding datasets. Additionally, ranges are sensitive to outliers. However, for the by-gender datasets without outliers, the fact that the range of the MON dataset is greater than the range of the FON dataset is consistent with the fact the standard deviation and variance of the MON dataset are greater than the standard deviation and variance of the FON dataset. If it were ideal to draw conclusions from the by-gender datasets without outliers and the by-gender samples represented larger by-gender populations, then it would be reasonable to say not only that male individuals on average exercise for 1.2 times as many hours per week than female individuals, but also that the numbers of hours per week that male individuals exercise are more spread out than the numbers of hours per week that female individuals exercise.

*Standard Deviation*

The standard deviation of a quantitative dataset

The standard deviations of the by-gender datasets are

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Standard Deviation** | | | | | |
| **with Outliers** | | | **without Outliers** | | |
| **F (h)** | **M (h)** | **NB (h)** | **F (h)** | **M (h)** | **NB (h)** |
| 5.1 | 3.6 | ––––– | 2.2 | 2.9 | ––––– |

According to Dr. Timchenko, the standard deviation corresponding to a dataset is a measure of variation about the mean of the data in that dataset, and can be thought of as the “average distance from the mean” of data. Larger standard deviations represent larger degrees of variation. The standard deviation corresponding to a version of a dataset with outliers can be significantly larger than the standard deviation corresponding to a version of the dataset without outliers. The standard deviation of the FOY dataset is 2.3 times the standard deviation of the FON dataset; the standard deviation of the MOY dataset is 1.2 times the standard deviation of the MON dataset.

Given the by-gender datasets without outliers, the fact that the standard deviation of the MON dataset is greater than the standard deviation of the FON dataset is consistent with the fact that the range and variance of the MON dataset are greater than the range and variance of the FON dataset.

When data in a quantitative dataset are normally distributed, 68.3 percent of data lie within one standard deviation of the mean, 95.5 percent of data lie within two standard deviations of the mean, and 99.7 percent of data lie within three standard deviations of the mean. According to Dr. Timchenko, a usual value is a datum that lies within two standard deviations of the mean. Assuming the data in the FON dataset were normally distributed, then 68.3 percent of the FON data would lie within one standard deviation (i.e., 2.2 hours) of the mean (i.e., 3.2 hours) (i.e., between 1.0 hours and 5.4 hours), all usual values would lie within two standard deviations (i.e., 4.4 hours) of the mean (i.e., between -1.2 hours and 7.6 hours), and virtually all data would lie within three standard deviations (i.e., 6.6 hours) of the mean (i.e., between -3.4 hours and 9.8 hours). However, the FON dataset is roughly W-shaped and is not normally distributed.

*Skewness*

According to the National Institute of Standards and Technology [1], univariate skewness

According to this formula, the skewnesses of the by-gender datasets are

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Skewness** | | | | | |
| **with Outliers** | | | **without Outliers** | | |
| **F** | **M (h)** | **NB (h)** | **F (h)** | **M (h)** | **NB (h)** |
| 3.3 | 0.9 | ––––– | 0.0 | 0.2 | ––––– |

The by-gender datasets with outliers are positively skewed by their outliers. The FON dataset is very slightly positively skewed. The MON dataset is slightly positively skewed. No by-gender dataset has a symmetric frequency distribution (i.e., a symmetric “W”). No by-gender data has a uniform frequency distribution (i.e., a “—”).

*Variance*

The variance of a quantitative dataset

The variances of the by-gender datasets are

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Standard Deviation** | | | | | |
| **with Outliers** | | | **without Outliers** | | |
| **F (h2)** | **M (h2)** | **NB (h2)** | **F (h2)** | **M (h2)** | **NB (h2)** |
| 25.8 | 12.8 | ––––– | 4.7 | 8.6 | ––––– |

According to Dr. Timchenko, the variance corresponding to a dataset is a measure of spread that is used for estimation but not for interpretation.

**Outliers**

An outlier of an ascending-ordered quantitative dataset is a datum that has a value less than the lower fence of the dataset or greater than the upper fence of the dataset. The lower fence of the dataset

where is the value of the first quartile of the dataset and is the Interquartile Range of the dataset. The upper fence of the dataset

where is the value of the third quartile of the dataset. The first quartile of the dataset is the median of the half of the dataset with indices less than the index of the median of the dataset. The third quartile of the dataset is the median of the half of the dataset with indices greater than the index of the median of the dataset. The Interquartile Range of the dataset is the difference between the third quartile and the first quartile.

For the FOY dataset, the outliers are the four highest values in the dataset (i.e., 10, 10, 10, 30). For the MOY dataset, the outlier is the highest value in the dataset (i.e., 15). Excluding these outliers from calculations and interpretation of sample statistics allows noting consistency between high mean, median, and closest-to-mean mode for the MON dataset relative to the mean, median, and closest-to-mean mode for the FON dataset. Excluding these outliers from calculations and interpretation of sample statistics allows noting consistency between high range, standard deviation, and variance for the MON dataset relative to the range, standard deviation, and variance for the FON dataset.

**Box-and-Whisker Plots**

The minima and maxima of the by-gender datasets are

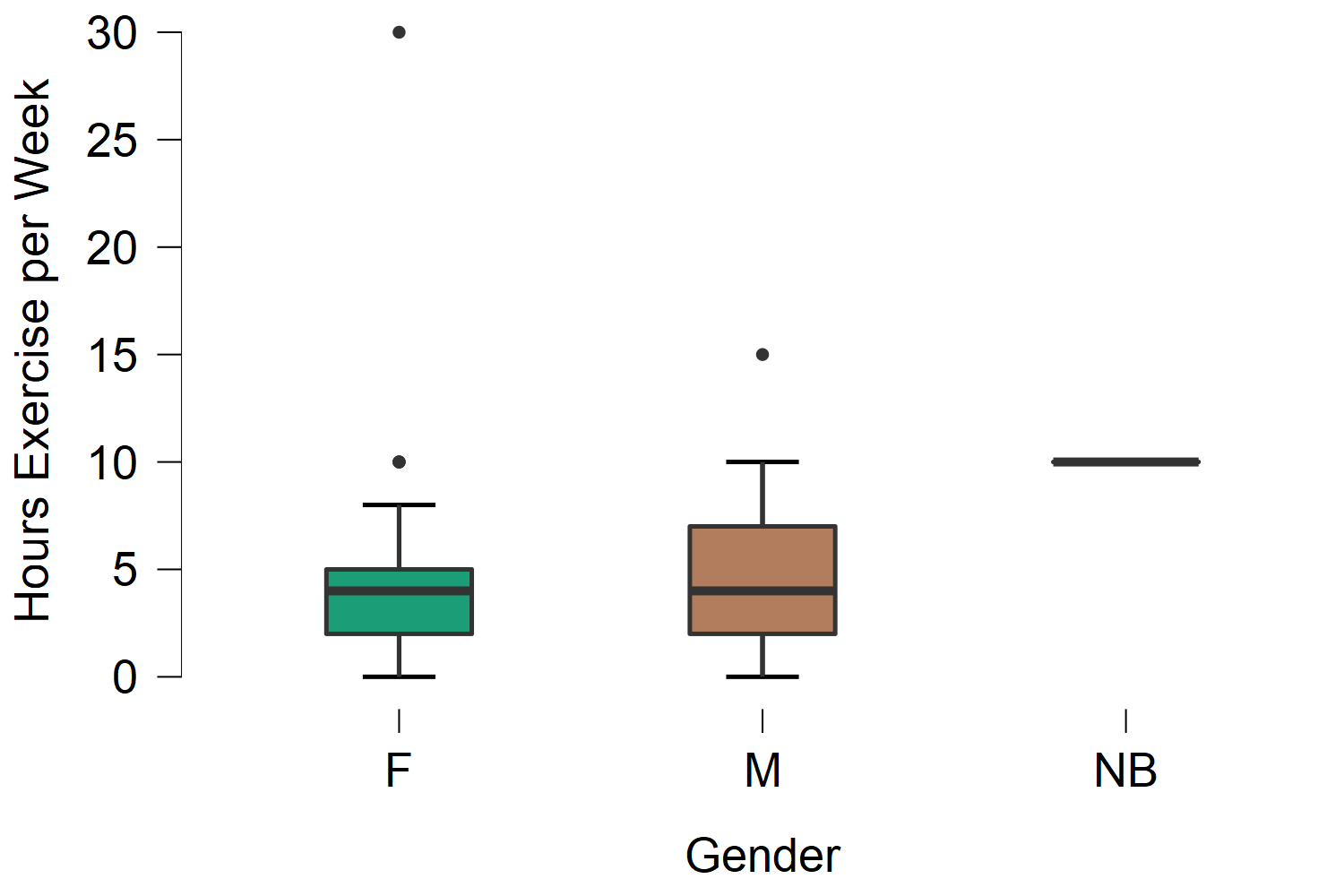
|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Minimum** | | | | | |
| **with Outliers** | | | **without Outliers** | | |
| **F (h2)** | **M (h2)** | **NB (h2)** | **F (h2)** | **M (h2)** | **NB (h2)** |
| 0 | 0 | 10 | 0 | 0 | 10 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Minimum** | | | | | |
| **with Outliers** | | | **without Outliers** | | |
| **F (h2)** | **M (h2)** | **NB (h2)** | **F (h2)** | **M (h2)** | **NB (h2)** |
| 30 | 15 | 10 | 8 | 10 | 10 |

The minimum-without-outliers and maximum-without-outliers of the FOY and MOY datasets are 8 and 10.

A box-and-whisker plot is a graph that presents the minimum-without-outliers, first quartile, median, third quartile, maximum-without-outliers, and outliers of an ascending-ordered quantitative dataset with outliers (if any). Below is a graph presenting the box-and-whisker plots corresponding to the by-gender datasets with outliers.

**Hours Exercise per Week**



Inspecting the above graph, the minima-without-outliers (i.e., 0), first quartiles (i.e., 2), minimum-without-outliers/first-quartile ranges (i.e., 2), medians (i.e., 4), and third-quartile/maximum-without-outliers ranges are the same for the FOY and MOY datasets. When outliers are excluded, minima-without-outliers, first quartiles, minimum-without-outliers/first-quartile ranges, third quartiles, maxima-without-outliers, third-quartile/maximum-with-outliers ranges, and interquartile ranges stay the same. It is always the case that the range and interquartile range is high for the MOY dataset relative to the range and interquartile range for the FOY dataset, which is consistent with the standard deviation being high for the MOY dataset relative to the standard deviation for the FOY dataset. The medians for the FOY and MOY dataset are equal; the median for the MON dataset is higher than the median for the FON dataset, which is consistent with the mean, median, and mode being high for the MON dataset relative to the mean, median, and mode of the FON dataset. The median/maximum ranges for the FOY and MOY datasets are greater than the corresponding minimum/median ranges; the FOY and MOY datasets are positively skewed.

**Summary**

In this paper, datasets were provided for a sample of 38 female individuals, a sample of 27 male individuals, and a sample of 1 non-binary individual, along with visualizations and summary statistics for versions of the datasets with and without outliers. The definitions, values, and appropriateness of three measures of center (i.e., arithmetic mean, median, and mode) and three measures of spread (i.e., range, standard deviation, and variance) were discussed. Measures of center and measures of spread were compared across datasets and across a with-outliers/without-outliers dimension. Measures of center for the dataset without outliers corresponding to the sample of male individuals consistently were greater than the corresponding measures of center for the dataset without outliers corresponding to the sample of female individuals. Measures of spread for the dataset without outliers corresponding to the sample of male individuals consistently were greater than the corresponding measures of spread for the dataset without outliers corresponding to the sample of female individuals.

Histograms to visualize Frequency of Hours Exercise per Week for Female and Male Individuals were presented. Frequency distributions were roughly W-shaped, had one mode within one standard deviation of the mean, and were positively skewed. Box-and-whisker plots to visualize important landmarks of the by-gender datasets with outliers were presented and aided in comparing datasets across gender and the with-outliers/without-outliers dimension.

It should be noted that the results of this study are not generalizable to a larger population (e.g., students at PVCC). It seems reasonable to say that the samples in this study were insufficiently small (e.g., the number of individuals in the sample of non-binary individuals was 1). The students in the chosen clusters do not represent a random sample of a larger population. Students completed surveys non-blindly.

This paper provides motivation for conducting studies comparing datasets of hours exercise per week for by-gender populations (e.g., students at PVCC or citizens of countries with a quality of life above a certain threshold). This paper provided motivation for studying differences in types of exercise, intensity of exercise, and/or social norms around exercise across gender.

**References**

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