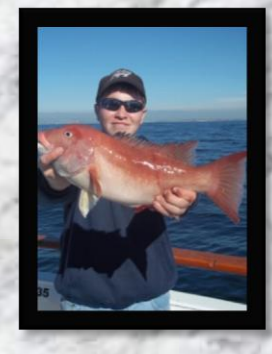
Juniors Have Higher Midlife Planned Earnings Than Seniors

Our Team:

Three students investigated this proposition.



Jimmy Bass

Hallie Bracken

Jeniffer Buerano

Methods:

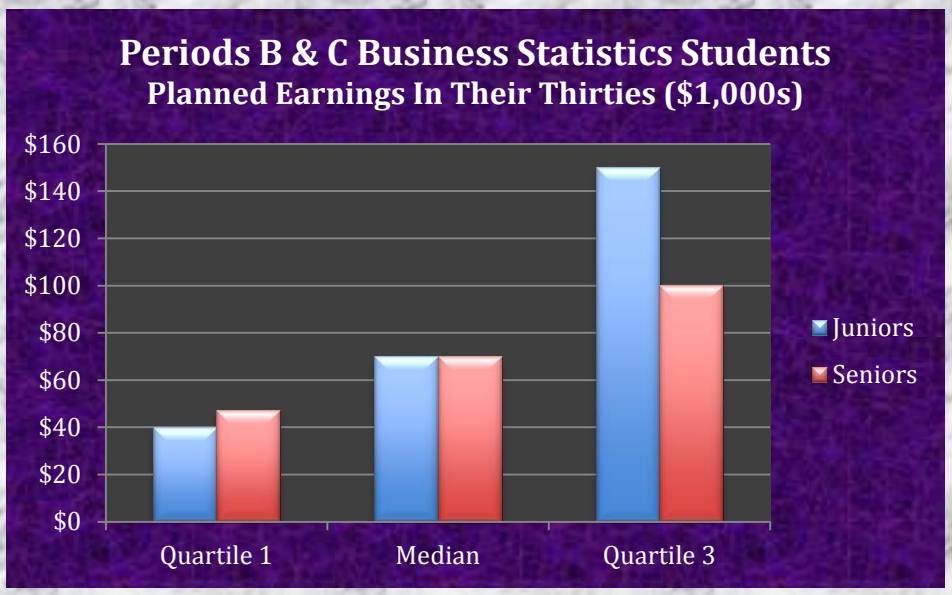
The data was gathered in a student survey administered to all Business Statistics students in the first week of the fall semester. Students completed the surveys at home, and were given assignment credit for their participation. No student was marked down for not answering individual questions. Our team used Excel's single variable data analysis functions and graphic displays to examine the data for patterns and relationships that would be most relevant to assessing the proposition. In the detailed distribution comparisons, hand-written parallel box plots were prepared to meet the remaining assignment requirements. One response for planned earnings was judged to be an extreme outlier and was excluded from the data analysis.

After completing our initial review of the data, we narrowed our investigations to the following three questions.

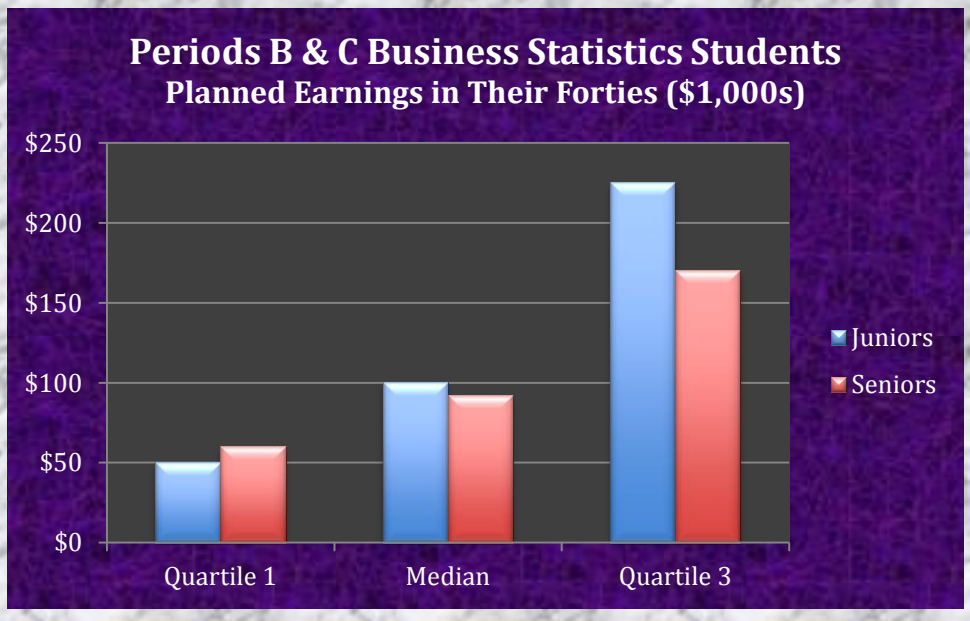
- #1 Did Period B & C junior Business Statistics students project higher earnings in their thirties than Period B & C senior Business Statistics students?
- #2 Did Period B & C junior Business Statistics students project higher earnings in their forties than Period B & C senior Business Statistics students?
- #3 Did Period B & C junior Business Statistics students project higher earnings in their fifties than Period B & C senior Business Statistics students?

Summary of Findings:

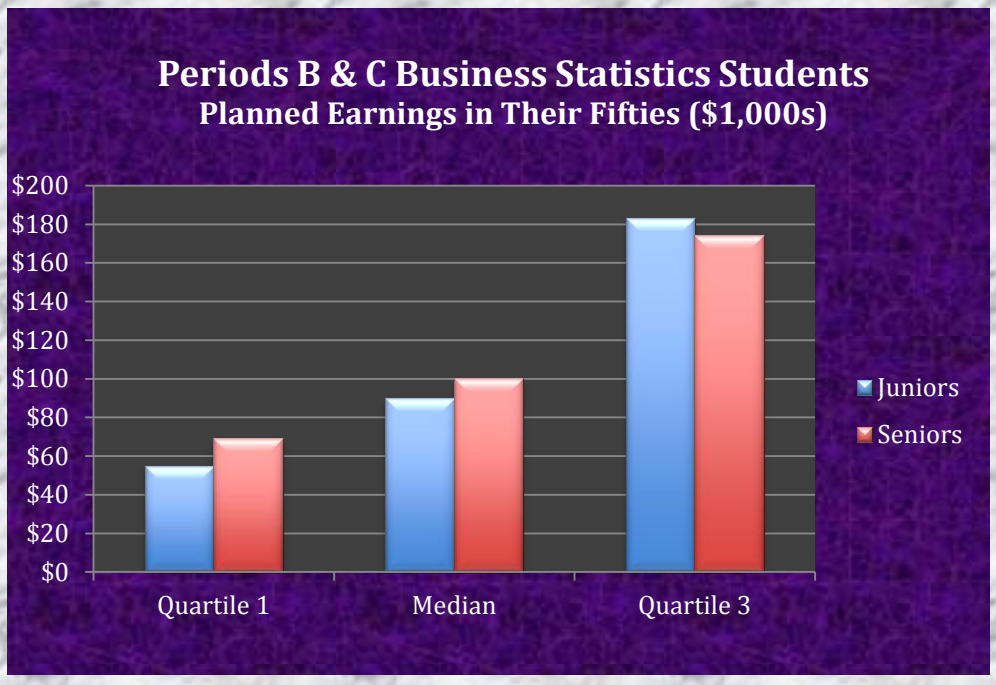
Question #1: Examination of planned earnings in their thirties for periods B and C Business Statistics students reveals that the first quartile value for juniors was $7,009 lower than the first quartile value for seniors; the medians were the same for both juniors and seniors; and the third quartile value for juniors was $50,000 higher than the third quartile value for juniors.



Question #2: Examination of planned earnings in their forties for periods B and C Business Statistics students reveals that the first quartile value for juniors was $10,000 lower than the first quartile value for seniors; the median value for juniors was $8,000 higher than the median value for seniors; and the third quartile value for juniors was $55,000 higher than the third quartile value for seniors.



Question #3: Examination of planned earnings in their fifties for period B and C Business Statistics students reveals that the first quartile value for juniors was $15,000 lower than the first quartile value for seniors; the median value for juniors was $10,000 lower than the median value for seniors; and the third quartile value for juniors was $17,000 lower than the third quartile value for seniors.



Conclusion: **Based on these specific findings, we conclude the proposition is not supported. No clear pattern of data to support the original proposition exists. Seniors projected higher earnings in their fifties, while juniors projected higher earnings in their forties.**

Detailed Findings:

The report has been organized as follows:

Description of Distribution:

Planned Earnings in Their Thirties in the population of
Period B & C Junior Business Statistics Students 5

Planned Earnings in Their Thirties in the population of
Period B & C Senior Business Statistics Students 6

Planned Earnings in Their Forties in the population of
Period B & C Junior Business Statistics Students 7

Planned Earnings in Their Forties in the population of
Period B & C Senior Business Statistics Students 8

Planned Earnings in Their Fifties in the population of
Period B & C Junior Business Statistics Students 9

Planned Earnings in Their Fifties in the population of
Period B & C Senior Business Statistics Students 10

Comparisons of Distributions:

Table A. compares distribution of:
Planned Earnings in Their Thirties in the population of
Period B & C Junior Business Statistics Students
and
Planned Earnings in Their Thirties in the population of
Period B & C Senior Business Statistics Students 11

Table B. compares distribution of:
Planned Earnings in Their Forties in the population of
Period B & C Junior Business Statistics Students
and
Planned Earnings in Their Forties in the population of
Period B & C Senior Business Statistics Students 12

Table C. compares distribution of:
Planned Earnings in Their Fifties in the population of
Period B & C Junior Business Statistics Students
and
Planned Earnings in Their Fifties in the population of
Period B & C Business Statistics Students 13

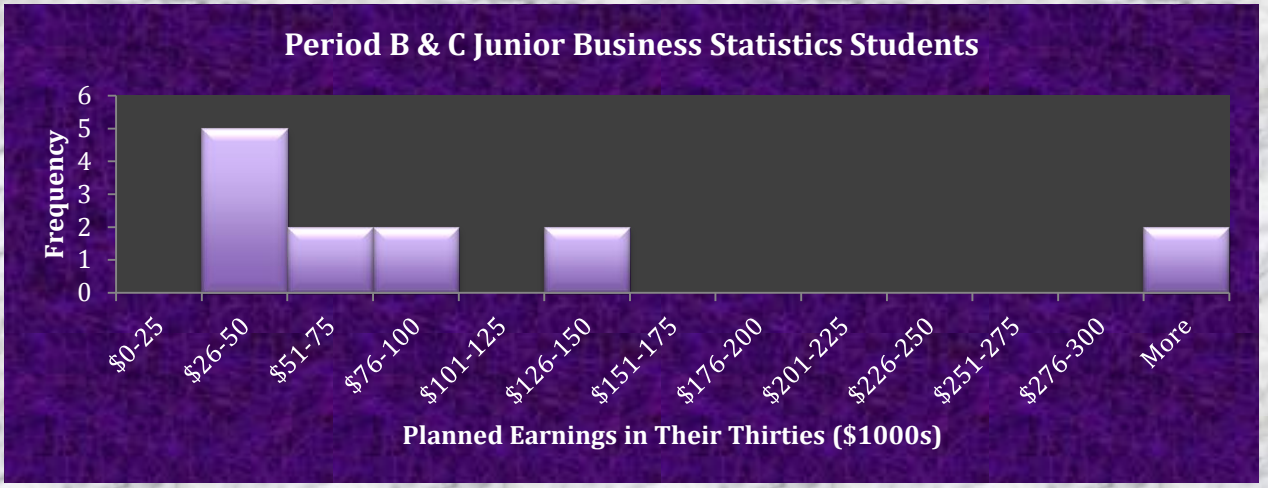
Population: Period B & C Junior Business Statistics Students

Variable: Planned Earnings in Their Thirties **Type:** Quantitative, Ratio, Continuous

Shape: A histogram was examined to determine the shape of the distribution. The histogram was displayed using a bin width of 25 ($1,000s) increments.

This plot was found to be unimodal and highly skew right.

The Fisher skew statistic was 2.4. This statistic fell outside the computed range of -1.4 to +1.4 indicating that the distribution's shape is highly skew right.



Center: Mean = 253 ($1,000s), Median = 70 ($1,000s), Mode = 30 ($1,000s)

The best measure of central tendency is the median because the distribution is skewed. This skew right shape causes the mean to be greater than the median.

Spread: Range = 1,470 ($1,000s), IQR = 114 ($1,000s), s = 456($1,000s)

The best measure of spread is the range and interquartile range because the distribution is skewed.

Outliers: IQR Method: Adding 1.5 times the IQR to the third quartile value of 150 ($1,000s) results in an upper outlier threshold of 321 ($1,000s). Subtracting 1.5 times the IQR from the first quartile value of 36.1 ($1,000s) results in a lower outlier threshold of -135 ($1,000s). Examination of the data found two outliers that exceeded these thresholds, ($1,000,000, $1,500,000).

Standard Deviation (s) Method: Adding and subtracting three standard deviations from the mean of 253($1,000s) establishes an upper outlier threshold of 1621 ($1,000s) and a lower threshold of -1115 ($1,000s). Examination of the data found no outliers that exceeded these thresholds.

The best measure of outliers is the IQR Method because the distribution is skewed.

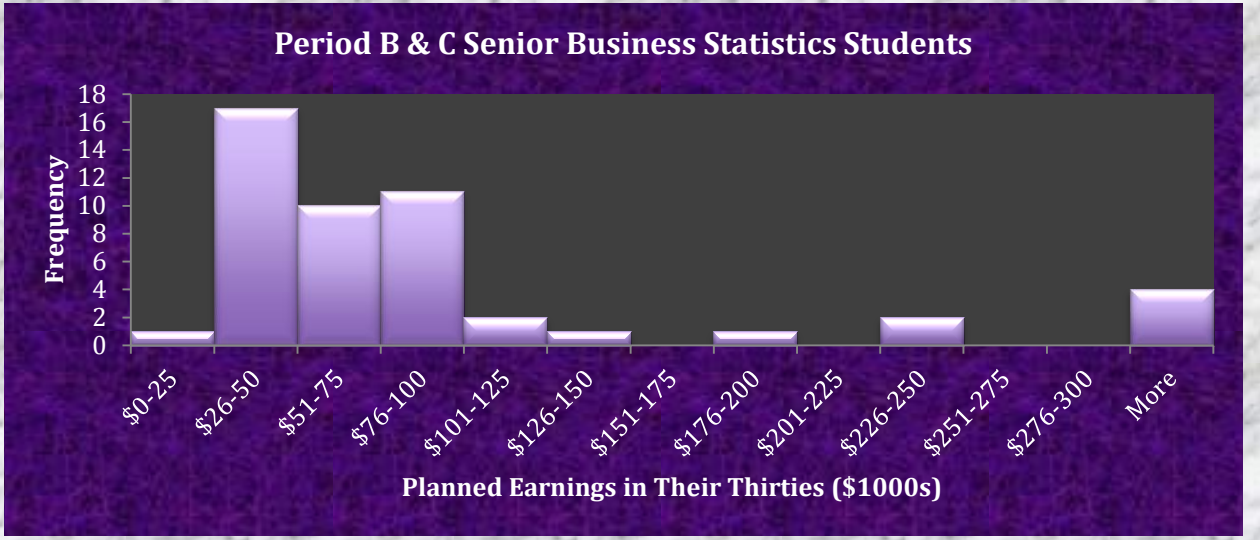
Population: Period B & C Senior Business Statistics Students

Variable: Planned Earnings in Their Thirties **Type:** Quantitative, Ratio, Continuous

Shape: A histogram was examined to determine the shape of the distribution. The histogram was displayed using a bin width of 25 ($1,000s) increments.

This plot was found to be **uni**modal and highly skew right.

The Fisher skew statistic was **4.0**. This statistic fell outside the computed range of **-.7 to +.7** indicating that the distribution's shape is highly skew right.



Center: Mean = **169** ($1,000s), Median = **70** ($1,000s), Mode = **60** ($1,000s)

The best measure of central tendency is the median because the distribution is skewed. This skew right shape causes the mean to be greater than the median.

Spread: Range = **1990** ($1,000s), IQR = **54.0** ($1,000s), s = **348.6**($1,000s)

The best measure of spread is the range and interquartile range because the distribution is skewed.

Outliers: IQR Method: Adding 1.5 times the IQR to the third quartile value of **100** ($1,000s) results in an upper outlier threshold of **181** ($1,000s). Subtracting 1.5 times the IQR from the first quartile value of **46** ($1,000s) results in a lower outlier threshold of **-35.0** ($1,000s). Examination of the data found seven outliers that exceeded these thresholds, ($200,000, $250,000, $250,000, $700,000 $900,000, $1,250,000, $2,000,000).

Standard Deviation (s) Method: Adding and subtracting three standard deviations from the mean of **169** ($1,000s) establishes an upper outlier threshold of **1215** ($1,000s) and a lower threshold of **-876** ($1,000s). Examination of the data found two outliers that exceeded these thresholds, ($1,250,000, $2,000,000).

The best measure of outliers is the IQR Method because the distribution is skewed.

Population: Period B & C Junior Business Statistics Students

Variable: Planned Earnings in Their Forties **Type:** Quantitative, Ratio, Continuous

Shape: A histogram was examined to determine the shape of the distribution. The histogram was displayed using a bin width of 25 ($1,000's) increments.

This plot was found to be unimodal and highly skew right.

The Fisher skew statistic was 2.9. This statistic fell outside the computed range of -1.5 to +1.5 indicating that the distribution's shape is highly skew right.

Center: Mean = 493 ($1000s), Median = 100 ($1000s), Mode = 40 ($1000s)

The best measure of central tendency is the median because the distribution is skewed. This skew right shape causes the mean to be greater than the median.

Spread: Range = 3460 ($1000s), IQR = 175 ($1000s), $\sigma =$ 1,035 ($1000s)

The best measure of spread is the range and interquartile range because the distribution is skewed.

Outliers: IQR Method: Adding 1.5 times the IQR to the third quartile value of 225 ($1000's) results in an upper outlier threshold of 488 ($1000's). Subtracting 1.5 times the IQR from the first quartile value of 50 ($1000's) results in a lower outlier threshold of -213 ($1000's). Examination of the data found two outliers that exceeded these thresholds, ($1,000,000, $3,500,000).

Standard Deviation (σ) Method: Adding and subtracting three standard deviations from the mean of 493 ($1000's) establishes an upper outlier threshold of 3598 ($1000's) and a lower threshold of -2612 ($1000's). Examination of the data found no outliers that exceeded these thresholds.

The best measure of outliers is the IQR Method because the distribution is skewed.

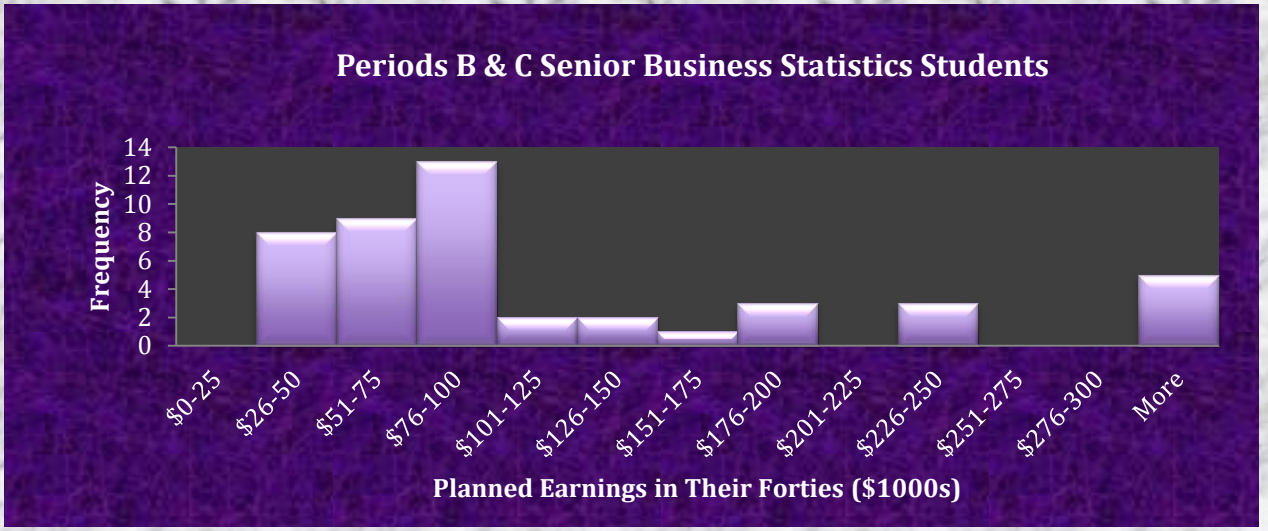
Population: Period B & C Senior Business Statistics Students

Variable: Planned Earnings in Their Forties **Type:** Quantitative, Ratio, Continuous

Shape: A histogram was examined to determine the shape of the distribution. The histogram was displayed using a bin width of 25 ($1,000s) increments.

This plot was found to be unimodal and highly skew right.

The Fisher skew statistic was 6.7. This statistic fell outside the computed range of -0.7 to +0.7 indicating that the distribution's shape is highly skew right.



Center: Mean = 858 ($1000s), Median = 92 ($1000s), Mode = 100 ($1000s)

The best measure of central tendency is the median because the distribution is skewed. This skew right shape causes the mean to be greater than the median.

Spread: Range = 29,970 ($1000s), IQR = 110 ($1000s), σ = 4,409 ($1000s)

The best measure of spread is the range and interquartile range because the distribution is skewed.

Outliers: IQR Method: Adding 1.5 times the IQR to the third quartile value of 170 ($1000s) results in an upper outlier threshold of 335($1000s). Subtracting 1.5 times the IQR from the first quartile value of 60 ($1000s) results in a lower outlier threshold of -105 ($1000s). Examination of the data found five outliers that exceeded these thresholds, ($800,000, $1,000,000, $1,500,000, $2,000,000, $30,000,000).

Standard Deviation (σ) Method: Adding and subtracting three standard deviations from the mean of 858 ($1000s) establishes an upper outlier threshold of 14083.3 ($1000s) and a lower threshold of 12367.3 ($1000s). Examination of the data found one outlier that exceeded these thresholds, ($30,000,000).

The best measure of outliers is the IQR Method because the distribution is skewed.

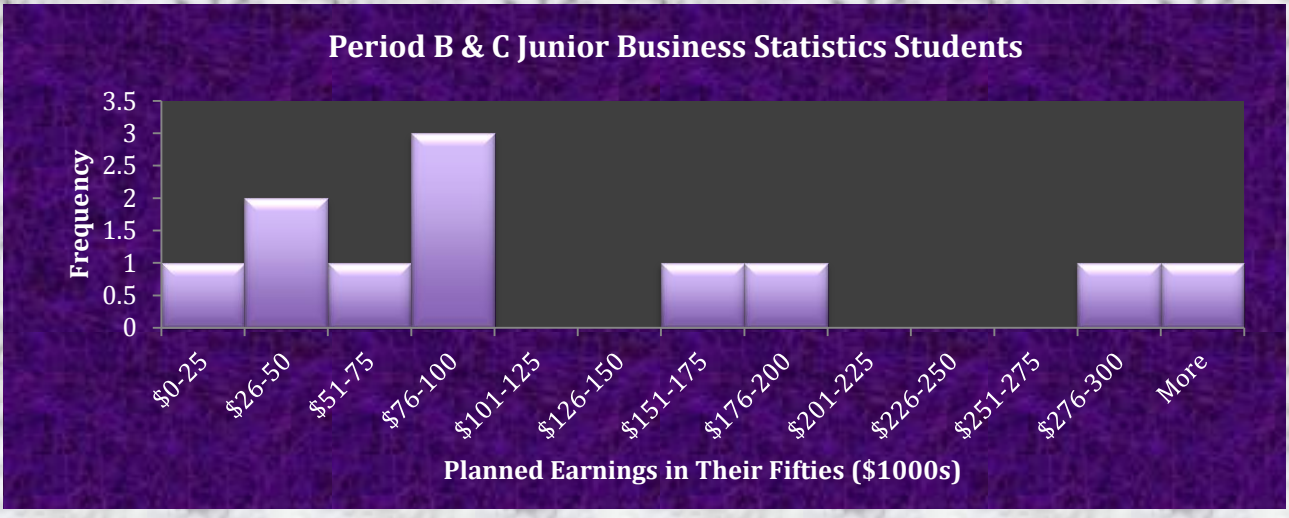
Population: Period B & C Junior Business Statistics Students

Variable: Planned Earnings in Their Fifties **Type:** Quantitative, Ratio, Continuous

Shape: A histogram was examined to determine the shape of the distribution. The histogram was displayed using a bin width of 25 ($1000s) increments.

This plot was found to be bimodal and highly skew right.

The Fisher skew statistic was 3.3. This statistic fell outside the computed range of -1.5 to +1.5, indicating that the distribution's shape is highly skew right.



Center: Mean = 536 ($1000s), Median = 90 ($1000s), Mode = 50 ($1000s)

The best measure of central tendency is the median because the distribution is skewed. This skew right shape causes the mean to be greater than the median.

Spread: Range = 4,800 ($1000s), IQR = 128 ($1000s), σ = 1,417 ($1000s)

The best measure of spread is the range and interquartile range because the distribution is skewed.

Outliers: IQR Method: Adding 1.5 times the IQR to the third quartile value of 183 ($1000s) results in an upper outlier threshold of 374 ($1000s). Subtracting 1.5 times the IQR from the first quartile value of 55 ($1000s) results in a lower outlier threshold of -136 ($1000s). Examination of the data found one outlier that exceeded these thresholds, ($4,800,000).

Standard Deviation (σ) Method: Adding and subtracting three standard deviations from the mean of 536 ($1000s) establishes an upper outlier threshold of 2,277,629 ($1000s) and a lower threshold of -3,714 ($1000s). Examination of the data found no outliers that exceeded these thresholds.

The best measure of outliers is the IQR Method because the distribution is skewed.

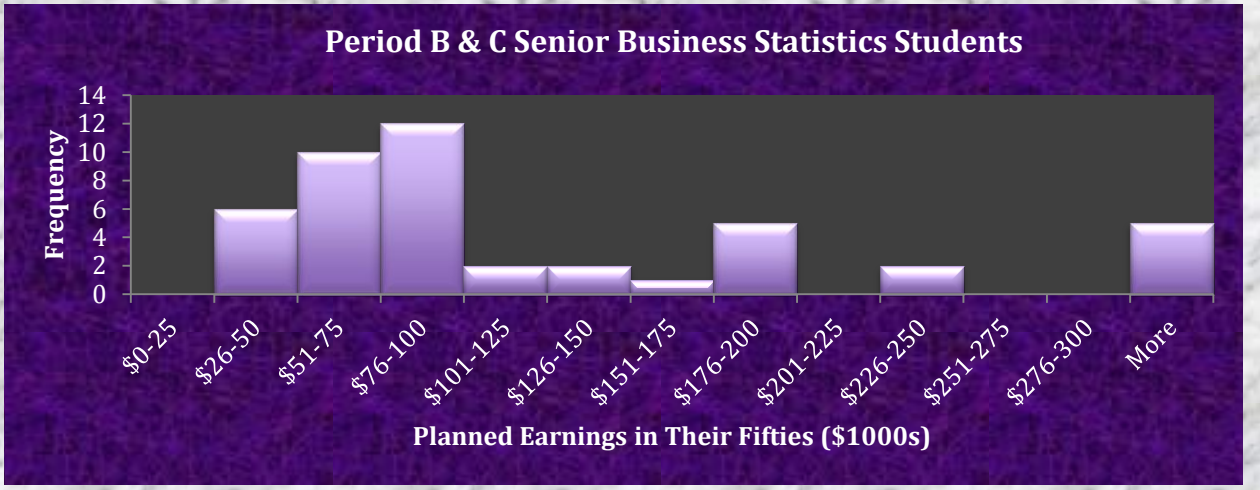
Population: Period B & C Senior Business Statistics Students

Variable: Planned Earnings in Their Fifties **Type:** Quantitative, Ratio, Continuous

Shape: A histogram was examined to determine the shape of the distribution. The histogram was displayed using a bin width of 25 ($1000s) increments.

This plot was found to be **uni**modal and highly skew right.

The Fisher skew statistic was **6.7**. This statistic fell outside the computed range of **-0.7 to +0.7** indicating that the distribution's shape is highly skew right.



Center: Mean = **217** ($1000s), Median = **100** ($1000s), Mode = **100** ($1000s)

The best measure of central tendency is the median because the distribution is skewed. This skew right shape causes the mean to be greater than the median.

Spread: Range = **1,710** ($1000s), IQR = **105** ($1000s), σ = **377**($1000s)

The best measure of spread is the (range and interquartile range because the distribution is skewed.

Outliers: IQR Method: Adding 1.5 times the IQR to the third quartile value of **174** ($1000s) results in an upper outlier threshold of **332** ($1000s). Subtracting 1.5 times the IQR from the first quartile value of **69** ($1000s) results in a lower outlier threshold of **-88.5** ($1000s). Examination of the data found four outliers that exceeded these thresholds, ($800,000, $1,000,000, $1,700,000, $1,750,000).

Standard Deviation (σ) Method: Adding and subtracting three standard deviations from the mean of **217**($1000s) establishes an upper outlier threshold of **1,348** ($1000s) and a lower threshold of **-914**($1000s). Examination of the data found no outliers that exceeded these thresholds.

The best measure of outliers is the IQR Method because the distribution is skewed.

Variable: Planned Earnings in Their Thirties in the population of Periods B & C Junior Business Statistics Students

Variable: Planned Earnings in Their Thirties in the population of Periods B & C Senior Business Statistics Students

	Juniors	Seniors	Comparison
Shape	Highly skew right	Highly skew right	The distributions have the same shape.
Center	Mean = **253** ($1,000s) Median = **70** ($1,000s)	Mean = **169** ($1,000s) Median = **70** ($1,000s)	Since both distributions are skewed, the best measure for comparing central tendencies is the median. The center of the distribution for Expected Earnings in Their Thirties for Juniors is nearly the same than the distribution for Expected Earnings in Their Thirties for Seniors.
Spread	Range = 1470 IQR = 114 σ = 456	Range = 1990 IQR = 54.0 σ = 349	Since both distributions are skewed, the best measure for comparing spread is the range and interquartile range. Examination of these statistics shows the distribution for Expected Earnings in Their Thirties for Seniors has more spread than the distribution for Expected Earnings in Their Thirties for Juniors.
Outliers	($1,000,000, $1,500,000) using the IQR Method	($200,000, $250,000, $250,000, $700,000, $900,000, $1,250,000, $2,000,000) using the IQR Method	The distribution for Expected Earnings in Their Thirties for Juniors has **two** outliers, while the distribution for Expected Earnings in Their Thirties for Seniors has **seven** outliers.

Variable: Planned Earnings in their Forties in the population of Period B & C Junior Business Statistics Students

Variable: Planned Earnings in their Forties in the population of Period B & C Senior Business Statistics Students

	Juniors	Seniors	Comparison
Shape	Highly skew right	Highly skew right	The distributions have the same shape.
Center	Mean = **493** ($1000s) Median = **100** ($1000s)	Mean = **858** ($1000s) Median = **92** ($1000s)	Since both distributions are skewed, the best measure for comparing central tendencies is the median. The center of the distribution for Planned Earnings in Their Forties for Seniors is about 8 units lower than the distribution for Planned Earnings in Their Forties for Juniors.
Spread	Range = 3,460 IQR = 175 σ = 1,035	Range = 29,970 IQR = 110 σ = 4,409	Since both distributions are skewed, the best measure for comparing spread are the range and interquartile range. Examination of these statistics shows the distribution for Planned Earnings in their Forties for Seniors has more spread than the distribution for Planned Earnings in their Forties for Juniors.
Outliers	($1,000,000, $3,500,000) using the IQR Method.	($800,000, $1,000,000, $1,500,000, $2,000,000, $30,000,000) using the IQR Method.	The distribution for Planned Earnings in their Forties for Juniors has **two** outliers, while the distribution for Planned Earnings in their Forties for Seniors has **five** outliers.

Variable: Planned Earnings in Their Fifties in the population of Period B & C Junior Business Statistics Students

Variable: Planned Earnings in Their Fifties in the population of Period B & C Senior Business Statistics Students

	Juniors	Seniors	Comparison
Shape	Highly skew right	Highly skew right	The distributions have the same shape.
Center	Mean = **536** ($1000s) Median = **90** ($1000s)	Mean = **22,434** ($1000s) Median = **100** ($1000s)	Since both distributions are skewed, the best measure for comparing central tendencies is the median. The center of the distribution for Planned Earnings in Their Fifties for Juniors is about 10 units lower than the distribution for Planned Earnings in Their Fifties for Seniors.
Spread	Range = 4,800 IQR = 128 σ = 1,417	Range = 1,710 IQR = 105 σ = 377	Since both distributions are skewed, the best measure for comparing spread is the range and interquartile range. Examination of these statistics shows the distribution for Planned Earnings in Their Fifties for Juniors has more spread than the distribution for Planned Earnings in Their Fifties for Seniors.
Outliers	($4,800,000) using the IQR Method	($800,000, $1,000,000, $1,700,000, $1,750,000) using the IQR Method	The distribution for Planned Earnings in Their Fifties for Juniors has **one** outlier, while the distribution for Planned Earnings in Their Fifties for Seniors has **four** outliers.