

Question 1

The 95% confidence interval for heart rate during mental arithmetic ($M = 81.2924$, $SD = 13.61916$) was calculated in SPSS. The 95% confidence interval was between 79.2836 and 83.3012. This information already offers a clue as to whether the heart rate during mental arithmetic is significantly different from the 'standard' heart rate of 72, as addressed in Question 2. Note that 72 is not within the confidence interval.

The readout was obtained through the Analyze→Explore feature of SPSS, with heart rate mental arithmetic entered as the dependent variable.

Case Processing Summary

| | Cases | | | | | |
|-------------------------------|-------|---------|---------|---------|-------|---------|
| | Valid | | Missing | | Total | |
| | N | Percent | N | Percent | N | Percent |
| Heart rate, mental arithmetic | 179 | 98.9% | 2 | 1.1% | 181 | 100.0% |

Descriptives

| | | Statistic | Std. Error | |
|-------------------------------|----------------------------------|-------------|------------|--|
| Heart rate, mental arithmetic | Mean | 81.2924 | 1.01794 | |
| | 95% Confidence Interval for Mean | Lower Bound | 79.2836 | |
| | | Upper Bound | 83.3012 | |
| | 5% Trimmed Mean | 80.9810 | | |
| | Median | 79.6667 | | |
| | Variance | 185.481 | | |
| | Std. Deviation | 13.61916 | | |
| | Minimum | 52.00 | | |
| | Maximum | 130.67 | | |
| | Range | 78.67 | | |
| | Interquartile Range | 19.33 | | |
| | Skewness | .459 | .182 | |
| | Kurtosis | .292 | .361 | |

Question 2

In order to determine whether the subjects had a heart rate significantly different from 72, a one-sample t test was conducted in SPSS, with the test value set to 72.

One-Sample Statistics

| | N | Mean | Std. Deviation | Std. Error Mean |
|-------------------------------|-----|---------|----------------|-----------------|
| Heart rate, mental arithmetic | 179 | 81.2924 | 13.61916 | 1.01794 |

One-Sample Test

| | Test Value = 72 | | | | |
|-------------------------------|-----------------|-----|-----------------|-----------------|-------------------------------------------|
| | t | df | Sig. (2-tailed) | Mean Difference | 95% Confidence Interval of the Difference |
| | | | | | Lower |
| Heart rate, mental arithmetic | 9.129 | 178 | .000 | 9.29236 | 7.2836 |

One-Sample Test

| | Test Value = 72 |
|-------------------------------|-------------------------------------------|
| | 95% Confidence Interval of the Difference |
| | Upper |
| Heart rate, mental arithmetic | 11.3012 |

At $p < 0.001$, the sample mean was significantly different from 72. The sample mean ($M = 81.2924$, $SD = 13.61916$) was significantly higher than 72 (by 9.29236 beats per minute). This finding offers some support for the claim that performing a mental arithmetic task generates stress, concentration, or some other state that is associated with a higher heart rate. Another way of checking that the observed heart rate for mental arithmetic is significantly higher than the standard heart rate is to observe that 0 is not within the 95% confidence interval of the difference

given by SPSS. The confidence interval of the difference is between 7.2836 and 11.3012. Had 0 been included in this confidence interval, we would have concluded that there was no significant difference between heart rate for mental arithmetic and the test mean of 72.

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