

**Caffeine's Effect on Heart Rate Recovery Time**

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Section 1

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In three random table groups three hypotheses were formulated and written on the board. Out of the nine hypotheses (three from each group) one experiment was designed to test this hypothesis: If one does not drink caffeinated drinks, then their heart rate recovery time will be faster than one who does drink caffeine. The question being answered therefore is, “Does caffeine have any effect on heart rate recovery time?” In this case the independent variable was the caffeine and the dependent variables were the pulse rate and recovery time. In the experiment, test subjects performed an exercise using a step stool for a set amount of time and their heart rate was measured. The time it took for their heart rate to return to their previously measured resting heart rate is the recovery time. The data was recorded in data tables and the averages of each of the three groups were compared. Two out of the three groups supported the hypothesis, the other groups' data rejected the hypothesis. This could have been due to possible error in the test groups and/or bias within the design.

## **Materials and Methods**

To begin the experiment, the class was first divided in two groups, one side of the class had non- caffeinated test subjects while the other side of the class had caffeinated subjects. From there each group split their groups into three, randomly by counting in threes. For example those who were counted as ones were in group one, twos were in group two, etc. From there the two separate groups now became three groups of mixed test subjects with half caffeinated, half non-caffeinated. When conducting the experiment the following materials were used: 8in high step stool, metronome, and timer. In these groups everyone took their resting heart rate by either feeling it on their radial artery or carotid. Subjects counted their heart beats for 15 seconds and then multiplied that number by four to calculate heart rate. Each person one by one started

stepping up and down on the stool to the beat of the metronome for three minutes. The beat gave us an “up, up, down, down” rhythm of 30 steps per minute to follow when stepping. Immediately after this the subject calculated their heart rate the same way as before. Now waiting 30 seconds for a rest period, the subject was asked to measure their heart rate again. This process was repeated (wait 30 seconds, take heart rate) until their heart rate had recovered down to their resting heart rate which was measured before. Once all data was taken and jotted down in the data tables, the averages were taken and compared between the three groups to see if the data either supported or rejected the hypothesis.

## Results

The results found were supposed to support the hypothesis “ If one does not drink caffeine drinks, then their heart rate recovery time will be faster than one who does drink caffeine”. The results found should show that the caffeinated subjects should have a higher recovery rate than those who aren’t, so it would be a larger number in seconds. The data was recorded in tables and the caffeinated group was labeled as “Treatment 1” and the non-caffeinated group as “Treatment 2”. Three data points were measured for each group: average resting pulse rate, average pulse rate after step test, and average recovery time. Below is the data that was recorded:

<b>Group 1</b>	<b>Treatment 1</b>	<b>Treatment 2</b>
<b>Before Step Test</b>	86 bpm	81 bpm
<b>After Step Test</b>	120 bpm	109 bpm
<b>Recovery Time</b>	90 sec	78 sec

<b><u>Group 2</u></b>	<b>Treatment 1</b>	<b>Treatment 2</b>
<b>Before Step Test</b>	84 bpm	77 bpm
<b>After Step Test</b>	127 bpm	129 bpm
<b>Recovery Time</b>	75 sec	70 sec

<b><u>Group 3</u></b>	<b>Treatment 1</b>	<b>Treatment 2</b>
<b>Before Step Test</b>	103 bpm	77 bpm
<b>After Step Test</b>	140 bpm	109 bpm
<b>Recovery Time</b>	80 sec	90 sec

In group 1, the average resting heart rate for T1 was 5 beats per minute faster than T2. After the step test T1 was 11 beats per minute faster than T2. Lastly, the recovery rate was 12 seconds slower than T2. In group 2, the average resting heart rate for T1 was 7 beats per minute faster than T2. After the step test T1 was 2 beats per minute slower than T2. The recovery rate was 5 seconds slower than T2. In group 3, the average resting heart rate for T1 was 26 beats per minute faster than T2. After the step test T1 was 31 beats per minute faster than T2. Finally, the recovery rate was 10 seconds faster than T2.

### **Conclusion**

To reiterate, the question being asked is “Does caffeine have any effect on heart rate recovery time?” In conclusion, the results show contradicting data. It can both support and reject the hypothesis that those who don’t drink caffeine have a faster recovery time than those who do drink caffeine. From the results, group one and two both support the hypothesis because they show a larger recovery time in seconds from T1 compared to T2. Group three shows the

opposite, therefore it rejects the hypothesis. This could occur due to possible error or bias in the experiment design. If there was a set amount of caffeine a test subject were to consume before the test then the data coming from the T1 group would be more similar and produce the same result. For example, if one person drank an energy drink that morning and another person drank a coffee they can have different amounts of caffeine between them. Another possibility is that there could be bias in the experiment and this could've been avoided by doing a single or double blind experiment. Everyone could've been given a drink, half caffeine, half no caffeine and the subjects wouldn't know. In a double blind experiment, the experimenter wouldn't have known either. In conclusion, the experiment needs to be tested on a larger group of people with a controlled variable of caffeine because the results can support and reject the hypothesis.