**Cardiovascular Health in Teenagers**

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**Introduction**

This investigation will cover how cardiovascular health in teenagers; specifically on how exercise can affect teenagers resting heart rate – the measurement of speed in how much the pulse beat in a minute (bpm). Typically, a normal teenager’s heart rate is between 60-100 bpm. The heart rate could increase up to 200 bpm with activity, and it can drop down to 30-40 bpm during sleep (“Bradycardia - Pediatric Heart Specialists”).

In an average lifespan, the heart pumps approximately 2.5 billion times; delivering oxygen, nutrients, and other compounds to all parts of the body. However, the heart can also fail due to poor diet, lack of exercise, infections, and more (Harvard Health Publishing).

Exercise is a crucial factor to keep teenagers healthy, encouraging a healthy lifestyle into adulthood. To maintain healthy growth, teenagers would at least an hour of moderate exercise on most days that includes aerobic, muscle and bone strengthening activity. Daily exercise in teenagers can help prevent conditions and poor lifestyle habits such as weight gain and a heart attack (University of Rochester Medical Center).

**Hypothesis**

If teenagers exercise more daily, their heart rate decreases. As exercise increases, the heart muscle gets stronger – being able to pump a greater amount of blood around the body, making the heart rate lower.

**Variables**

**Independent Variables:** The participants

**Dependent Variables:** The average heart rate (bpm) in 15 to 16-year-old teenagers

**Controlled variables:** Where the pulse is taken (wrist/neck), the age of teenagers (15-16), time taken to measure the heart rate (1 minute)

**Method:**

1. Gather all the materials that are needed for the investigation – paper or laptop to record the data, a pen, a calculator to calculate the average heart rate, a ruler to draw the graph, at least 20 participants, and a timer.
2. Create a table for the participants, the number of days they exercise, the trials of measuring the heart rate, the average heart rate, and gender as a heading for each column.
3. Before measuring the participant’s heart rate, ask how many days they exercise a week and allow them to rest for a minute or two.
4. By using a device such as a phone or laptop as a timer, measure the participant’s pulse either at the wrist or neck for one minute.
5. Record the heart rate onto the laptop or paper.
6. Repeat step three and four, two more times to be able to calculate the average heart rate of the participant.
7. Find nineteen more data of participants’ heart rate to at least get twenty sets of data.
8. By using a calculator, find each of the participants’ average heart rate.
9. Group the participants by the amount of exercise they do and find the average heart rate for the specific amount of days.
10. Draw an appropriate graph for the data.

**Data**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Exercise (days) | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Average bpm | 78 | 0 | 80 | 78 | 75 | 79 | 71 | 0 |
| Frequency of subjects | 2 | 0 | 4 | 6 | 4 | 3 | 2 | 0 |
| Subjects |  |  |  |  |  |  |  |  |
| 1 |  |  |  |  | ✓ |  |  |  |
| 2 |  |  |  | ✓ |  |  |  |  |
| 3 |  |  |  |  | ✓ |  |  |  |
| 4 |  |  | ✓ |  |  |  |  |  |
| 5 | ✓ |  |  |  |  |  |  |  |
| 6 |  |  |  | ✓ |  |  |  |  |
| 7 | ✓ |  |  |  |  |  |  |  |
| 8 |  |  |  |  | ✓ |  |  |  |
| 9 |  |  | ✓ |  |  |  |  |  |
| 10 |  |  |  | ✓ |  |  |  |  |
| 11 |  |  | ✓ |  |  |  |  |  |
| 12 |  |  |  | ✓ |  |  |  |  |
| 13 |  |  |  |  |  |  | ✓ |  |
| 14 |  |  |  |  |  | ✓ |  |  |
| 15 |  |  |  |  |  |  | ✓ |  |
| 16 |  |  |  |  | ✓ |  |  |  |
| 17 |  |  |  | ✓ |  |  |  |  |
| 18 |  |  |  |  |  | ✓ |  |  |
| 19 |  |  |  |  |  | ✓ |  |  |
| 20 |  |  |  | ✓ |  |  |  |  |
| 21 |  |  | ✓ |  |  |  |  |  |

**Reliability**

The data was mostly dependable since the trial of collecting the data was repeated and remained constant. However, there were a few participants who got their heart rate a while after some activities that could’ve affected the heart rate, even after resting for a few minutes.

**Validity**

The data that was taken wouldn’t be valid since the data was collected from other participants who measured their own set of data, which could’ve affected the results because the person who measured the heart rate of participants wasn’t constant, so the results may not be accurate.

**Outlier**

There weren’t any outliers in the average sets of data as there wasn’t any data that passed the upper fence of 110.75 bpm and the lower fence 45.75 bpm. However, during the third trial, participant 16 had a sudden drop of their heart rate from around 80bpm to around 50bpm which could be inaccurate, affecting the individual’s average heart rate.

**References**

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