**Introduction**

This investigation focuses on the amount of exercise a teenager does and if that affects their resting heart rate. The slower the individuals heart rate whilst resting, the healthier they are presumed to be. This phenomenon is related to the fact that the heart doesn’t need to work as hard in a state of rest, if that of a healthy person. The intention of the experiment was to identify if the above statement can be proven, thus stating that individuals who exercise rarely/not at all, will have a higher resting heart rate than those who exercise for a minimum of two days per week.

**Background research**

The heart is a part of the circulatory system and is responsible for pumping blood through the body. Maintaining a healthy lifestyle (diet and exercise) is vital to sustain heart health. Heart rate refers to the rate at which the heart pulses. In adults as well as teenagers, the average resting heart rate ranges between 60-100 beats per minute (BPM). Depending on a person’s heart rate, it can determine if an individual has a healthy heart. There are several factors individuals may experience that can affect their heart rate; these can include age, fitness, diet, existing diseases (e.g., diabetes), habits (e.g., smoking) and many more. Focusing on exercise, this investigation looked into identifying cardiovascular health in teenagers through the amount of exercise they do. Long term exercise, specifically aerobic, is thought to affect the parasympathetic nervous system. This system is known for the rest and digest response after a stressful or strenuous situation. The parasympathetic nervous system relaxes an individual and one of its functions is to slow heart rate. Therefore, a person that maintains regular exercise is more likely to have a lower resting heart rate.

**Hypothesis**

It is predicted that subjects who exercise 2 days or more will have a lower heart rate than subjects who exercise less.

**Variables**

Independent:

* Days of exercise

Dependent:

* Heart rate (BPM)

Controlled:

* Length of time to record heart rate (per minute)
* When the heart rate is recorded

**Materials**

* Participants (20)
* 1 Timer
* 1 Laptop (to record results)

**Method**

1. Place index and middle fingers on wrist (either left or right) of participant, where pulse can be felt.
2. Set timer for 30 seconds.
3. Press start on timer and begin to count how many beats are felt.
4. Multiple the number of beats counted, by two.
5. Record result in designated table.
6. Repeat steps 1-5 twice more for trial two and three, and do so for all participants.

**Data**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | Resting Heart rate (beats/minute) | | |  |
| Subject | Exercise (days per week) | Trial 1 | Trial 2 | Trial 3 | Average Resting Heart Rate (beats/minute) |
| 1 | 3 | 50 | 44 | 50 | 48.0 |
| 2 | 2 | 54 | 52 | 50 | 52.0 |
| 3 | 1 | 96 | 88 | 86 | 90.0 |
| 4 | 0 | 66 | 62 | 72 | 66.7 |
| 5 | 4 | 76 | 72 | 68 | 72.0 |
| 6 | 2 | 70 | 72 | 68 | 70.0 |
| 7 | 2 | 76 | 70 | 70 | 72.0 |
| 8 | 0 | 82 | 72 | 78 | 77.3 |
| 9 | 5 | 94 | 102 | 100 | 98.7 |
| 10 | 5 | 50 | 45 | 72 | 55.7 |
| 11 | 3 | 66 | 77 | 70 | 71.0 |
| 12 | 4 | 80 | 80 | 80 | 80.0 |
| 13 | 1 | 86 | 84 | 80 | 83.3 |
| 14 | 3 | 71 | 72 | 74 | 72.3 |
| 15 | 1 | 66 | 68 | 66 | 66.7 |
| 16 | 5 | 85 | 87 | 57 | 76.3 |
| 17 | 0 | 108 | 90 | 76 | 91.3 |
| 18 | 4 | 90 | 78 | 68 | 78.7 |
| 19 | 2 | 72 | 63 | 98 | 77.7 |
| 20 | 1 | 72 | 74 | 70 | 72 |

**Sources**

*Heart health (cardiovascular)* 2022, Wa.gov.au, viewed 20 March 2022, <https://www.healthywa.wa.gov.au/Health-conditions/Heart-health-cardiovascular#:~:text=The%20cardiovascular%20system%20relates%20to,important%20for%20your%20heart%20health.>.

‌*2 easy, accurate ways to measure your heart rate* 2020, Mayo Clinic, viewed 20 March 2022, <https://www.mayoclinic.org/healthy-lifestyle/fitness/expert-answers/heart-rate/faq-20057979#:~:text=A%20normal%20resting%20heart%20rate%20for%20adults%20ranges%20from%2060,to%2040%20beats%20per%20minute.>.

‌*Can the Food We Eat Affect Our Heart Rate? | Livestrong.com* 2011, LIVESTRONG.COM, viewed 20 March 2022, <https://www.livestrong.com/article/479713-can-the-food-we-eat-affect-our-heart-rate/>.

Oh, D-J, Hong, H-O & Lee, B-A 2016, ‘The effects of strenuous exercises on resting heart rate, blood pressure, and maximal oxygen uptake’, *Journal of Exercise Rehabilitation*, vol. 12, no. 1, pp. 42–46, viewed 20 March 2022, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4771152/>.

‌ *Parasympathetic Nervous System Functions | Simply Psychology* 2021, Simplypsychology.org, viewed 20 March 2022, <https://www.simplypsychology.org/parasympathetic-nervous-system.html#:~:text=The%20parasympathetic%20nervous%20system%20is%20also%20referred%20to%20as%20the,system%20leads%20to%20decreased%20arousal.>.

‌