Do People Who Exercise 2-3 Times per Week have a Faster Heart Rate Recovery?

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Acknowledgements

There are many people who have helped with my project and I would like to thank them all. I would like to thank my mom, Jennifer Surowiec, for helping me get organized and supporting me through my experiment. I would also like to thank my teacher, Mrs. Yee, for helping me choose a topic and edit my background information. Finally, I would like to thank everyone who participated in my project. They were so helpful and I cannot thank them enough.

Purpose and Hypothesis

The purpose of my investigation is to understand if people who exercise 2-3 times per week have a faster heart rate recovery than people who exercise less often.

My hypothesis is if I do a running test with two groups of people, one group who exercises 2-3 times per week and one group who exercises less often, then the group that exercises 2-3 times per week will have a faster heart rate recovery because their hearts are stronger due to more exercise.

What is the heart? The heart is one of the main organs in the body. It pumps blood all over the body. The heart consists of the outer muscles, chambers, valves, arteries, and veins. The study of the heart is called cardiology.

The heart's outer walls are what moves the heart. It has three layers: the endocardium, the myocardium, and the epicardium. The heart has four chambers right under the muscles. The top chambers are the left and right atriums and the bottom are the left and right ventricles. Valves stop the blood from flowing to the wrong parts of the body. There are four valves: the tricuspid, mitral, aortic, and pulmonary. The blood vessels move and pump the blood to the feet, hands, head, literally from the top to the bottom. Arteries carry blood with oxygen, veins carry non-oxygenated blood, and the veins exchange both.(National Heart Foundation, 2020)

How does the heart help the body? The heart is at the center of the circulatory system. It delivers blood all over the body using veins and blood vessels. The blood carries key nutrients and oxygen to keep the body moving and staying healthy. (Healthwise, 2020) The pulmonary system is a short loop between the heart and the lungs. The lungs receive deoxygenated blood and give back oxygenated blood to the heart. (Tortora, 2014) This system only carries blood between the heart and lungs. The circulatory system is also called the systemic system. This is where blood is pumped all over your body.

Running and aerobics are proven to help how well the heart pumps blood. Exercising the heart is the same as exercising the body. It makes the body healthy and strong. If the heart does not get enough exercise, the body can develop diabetes and can cause heart attacks.(Leaf group LTD, 2020.)

Raising one's heart rate is safe and better for the body. It trains the body to move blood and oxygen around more productively. This can lower risk for cancer and other diseases. Different ways to get the heart rate up are walking or running on an incline. Take the stairs instead of using an escalator or elevator. Do a short burst of a faster pace in the work out. Doing an exercise with different workouts and taking a shorter break time in between each workout is also good. (University of Texas MD Anderson Cancer Center, 2020)

Aerobics, also known as cardio, is a way for the body to meet its oxygen needs. Usually aerobics is light or moderate exercise over a long period of time. Different examples include cycling, swimming, and walking. Kenneth Cooper was the first person to open up the concept of aerobics. He started researching preventive medicine. In 1970 he created the Cooper Institute. Millions then started to work out to stay healthy. He soon became known as the "father of aerobics". Anaerobic exercise is different. Anaerobic is the need to meet your oxygen level. The idea of anaerobic exercise is that a bunch of energy is released within a small period of time. (Libretext, 2020)

The best exercise for keeping your heart healthy is fast pace walking, long distance running, tennis, swimming, cycling, and jump roping. Doing these exercises help keep the heart rate and blood pressure down, when resting and when exercising. Doing these exercises 5 times a week for 30 minutes will show the best results.

Many people think of heart rate and blood pressure as the same thing, however, it is not. Blood pressure is the strength and force blood flows against the walls of the arteries. Heart rate or pulse is the number of times the heart beats per minute. Blood pressure is taken using a cuff, it is measured in two numbers and heart rate is measured with a pulse oximeter. Two numbers are

used, oxygen numbers should usually be in the very high 90's to 100 with numbers below 95 considered as dangerous. Your pulse can be anywhere from 60-100 beats per minute.

What is the relation between heart rate and blood pressure? People think that blood pressure climbs when the heart beats faster. However, that is not true. Exercising like walking or running a long distance can raise heart rate significantly but blood pressure will stay the same or increase a little bit.(Fisher-Titus Medical Center, 2017)

Heart rate is how many times the heart beats per minute. A normal adult resting heart rate is 60 to 100 beats per minute. The maximum heart rate is the time when the heart works the hardest to meet the body's need for oxygen. This is mostly when working out or doing hard physical activities. (Harvard University, 2010-2020) If the body becomes used to working more, the heart rate should recover faster. When the body works less it takes longer for the heart to return to normal. After all the heart needs the same type of exercise as the body. A good way to know how healthy the body is to look at the heart rate.

The heart will recover faster as the body gets more fit. If the heart recovers 20 to 30 beats per minute that's a good place to be. An even better score is 50 to 60 beats per minute. Workouts should be adjusted if the heart rate recovery is lower than 20. The heart will recover slower the less the body works out. If the body works out more the heart will recover faster and the body is a lot healthier (Edwards, 2020)

The heart circulates blood all over your body using the circulatory system. To get that blood flowing the body needs exercise to make the heart stronger. Aerobics is the exercise that does the best job of that. The importance of working out to the heart makes a big difference to the health of people. A healthy heart helps people live longer and protects them from diabetes and prevents heart attacks. Heart health is important.

Materials Sheet

Notebook

Pencil

Pulse Oximeter

Timer

Calculator

Gym Shoes

Volunteers

Methods of Procedure

Step One: Have each of the subjects rest for five minutes, by sitting on the ground, talking quietly, and not being on their phone.

Step Two: Put the pulse oximeter on each of the subject's index finger and recorded their resting heart rate.

Step Three: Have each subject run a 200 meter sprint as fast as they can run.

Step Four: Take their heart rate using the pulse oximeter on their index finger, immediately after they finish running.

Step Five: Take their heart rate, in the same way as step four, 30 seconds after they finish running.

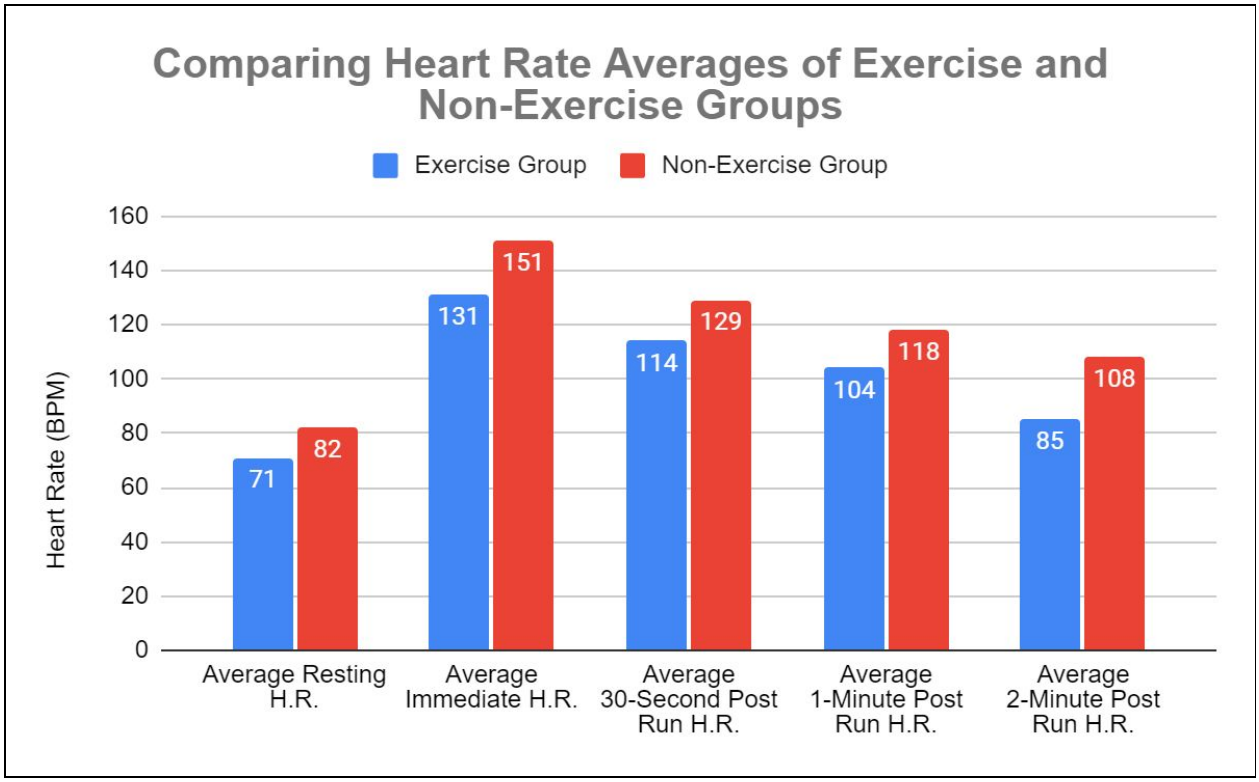
Step Six: Take their heart rate, in the same way as step four, one minute after they finish running.

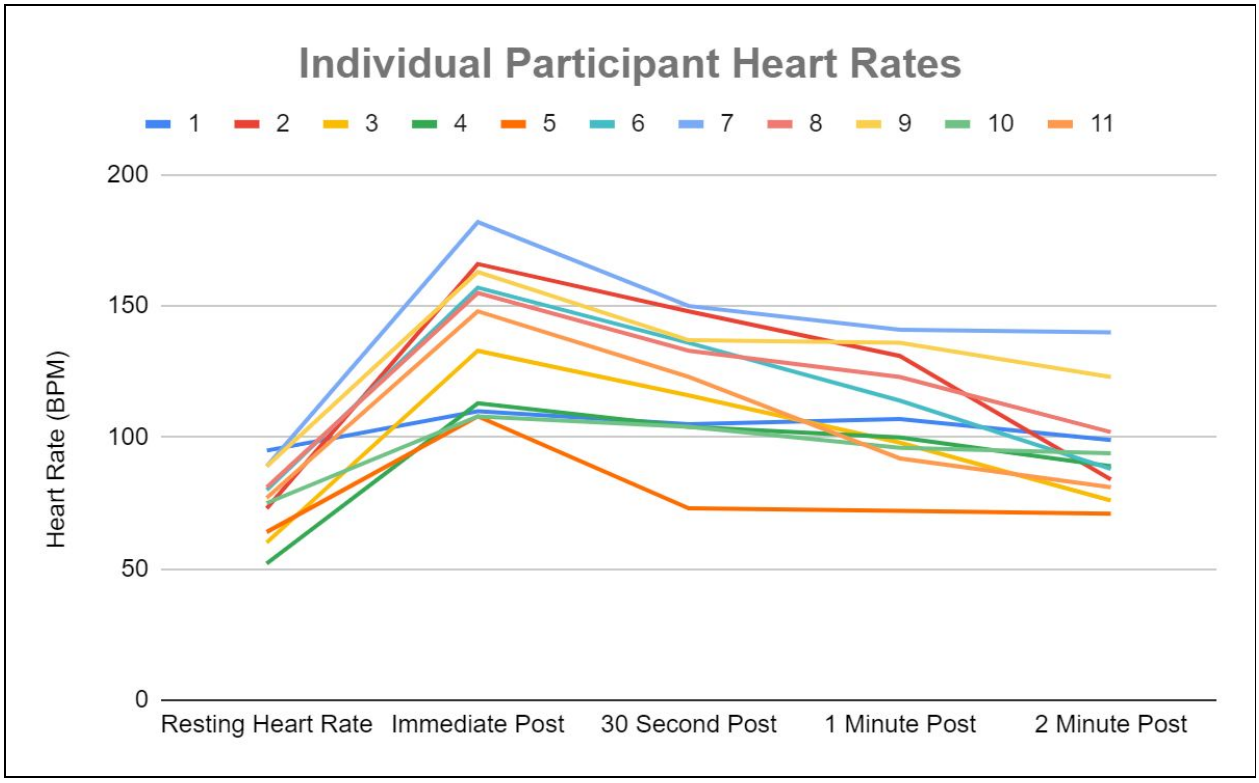
Step Seven: Take their heart rate, in the same way as step four, two minutes after they finish running.

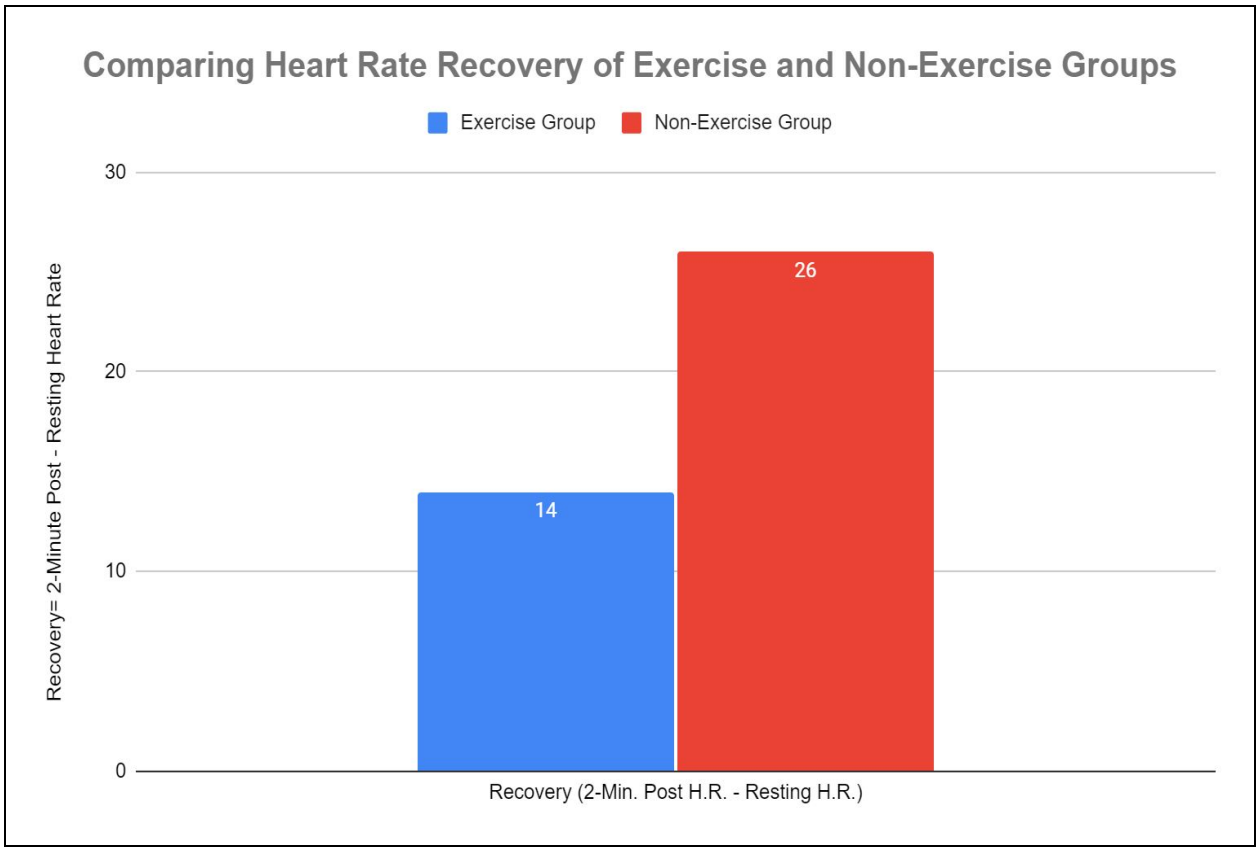
Data Results

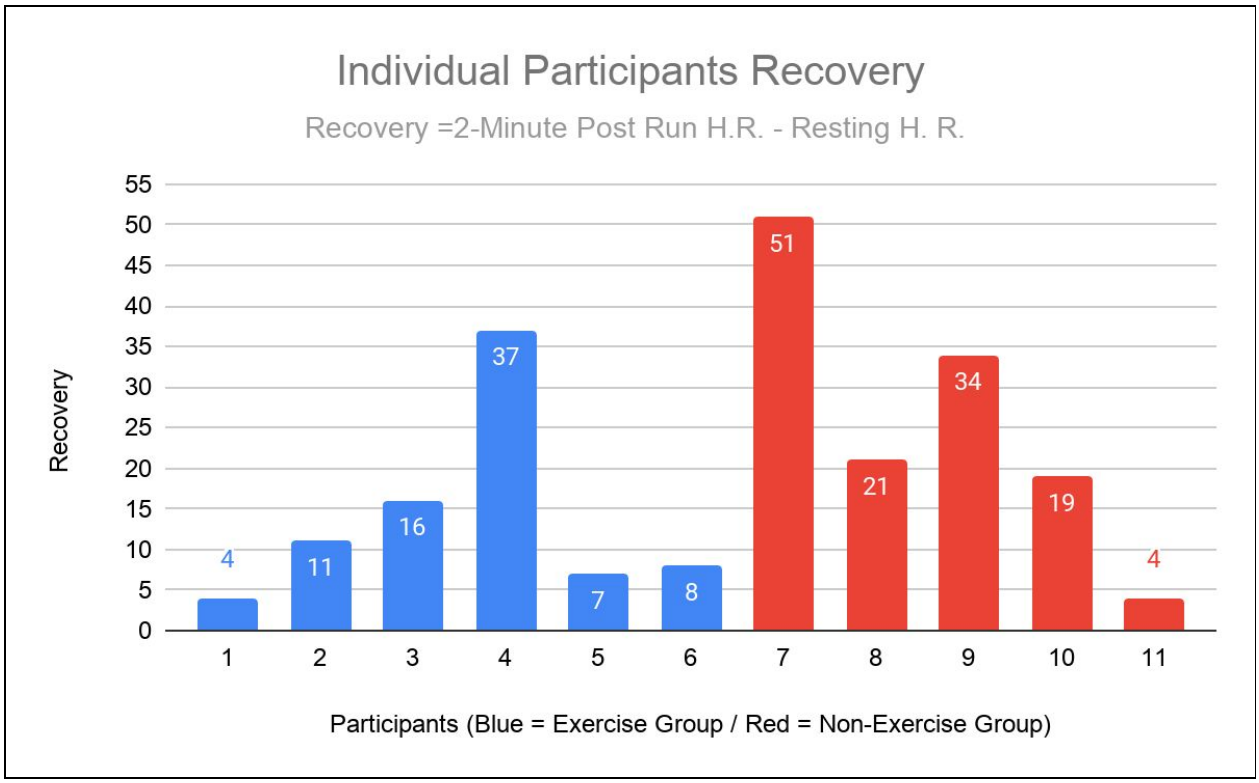
				Post Workout Heart Rate				Recovery*
Participant Number	Age	Work out to 2-3 times a week	Resting Heart Rate	Immediate Post	30 Second Post	1 Minute Post	2 Minute Post	Difference Between 2 Minute post and Resting Heart Rate
1	12	yes	95	110	105	107	99	**4**
2	12	yes	73	166	148	131	84	**11**
3	46	yes	60	133	116	98	76	**16**
4	12	yes	52	113	104	100	89	**37**
5	12	yes	64	108	73	72	71	**7**
6	13	yes	80	157	136	114	88	**8**
Average of Exercise Group:			**71**	**131**	**114**	**104**	**85**	**14**
7	13	no	89	182	150	141	140	**51**
8	46	no	81	155	133	123	102	**21**
9	12	no	89	163	137	136	123	**34**
10	13	no	75	108	104	96	94	**19**
11	12	no	77	148	123	92	81	**4**
Average of Non-Exercise Group:			**82**	**151**	**129**	**118**	**108**	**26**

* Recovery= 2 Minute Post Run - Resting Heart Rate


Comparing Heart Rate Averages of Exercise and Non-Exercise Groups
Exercise Group
Non-Exercise Group
Heart Rate (BPM)
160
140
120
100
80
60
40
20
0
71
82
131
151
114
129
104
118
85
108
Average Resting H.R.
Average Immediate H.R.
Average 30-Second Post Run H.R.
Average 1-Minute Post Run H.R.
Average 2-Minute Post Run H.R.


Individual Participant Heart Rates
1
2
3
4
5
6
7
8
9
10
11
Heart Rate (BPM)
200
150
100
50
0
Resting Heart Rate
Immediate Post
30 Second Post
1 Minute Post
2 Minute Post


Comparing Heart Rate Recovery of Exercise and Non-Exercise Groups
Exercise Group
Non-Exercise Group
30
20
10
0
Recovery= 2-Minute Post - Resting Heart Rate
14
26
Recovery (2-Min. Post H.R. - Resting H.R.)


Individual Participants Recovery
Recovery =2-Minute Post Run H.R. - Resting H. R.
Recovery
55
50
45
40
35
30
25
20
15
10
5
0
4
11
16
37
7
8
51
21
34
19
4
1
2
3
4
5
6
7
8
9
10
11
Participants (Blue = Exercise Group / Red = Non-Exercise Group)

Conclusion

The result of my experiment showed a difference in the exercise and non-exercise group. The non-exercise group had a higher resting heart rate then the exercise group. As expected, they also had a higher post workout heart rate then the exercise group across all measurements. The exercise group had a faster recovery then the non-exercise group shown by the fact that their recovery number (recovery number = 2 minutes post run heart rate - resting heart rate) was lower. A lower recovery number means they were closer to their resting heart rate 2 minutes after they ran.

The results show my hypothesis was correct. My hypothesis was that if I test two groups of people, one group who exercise 2-3 times per week and one group who does less, then the group who exercises 2-3 times per week will have a faster heart rate recovery. My data showed that the group who exercised more had a lower recovery number, meaning they got closer to their resting heart rate 2 minutes after their run than the non-exercise group . The exercise group recovered faster. My data backed up my hypothesis and showed me that the group that exercises 2-3 per week has a faster recovery than the non-exercise group because their heart is stronger.

Work Cited

Fisher Titus. (2017, December 7). What's the Difference Between Heart Rate and Blood Pressure? www.fishertitus.org. Retrieved November 9, 2020, from https://www.fishertitus.org/health/difference-between-blood-pressure-and-heart-rate

Healthwise. (2019, December 15). How the Heart Works. www.uofmhealth.org. Retrieved November 6, 2020, from https://www.uofmhealth.org/health-library/tx4097abc

Heart Foundation. (2020). How the Heart Works. heartfoundation.org.nz. Retrieved November 6, 2020, from https://www.heartfoundation.org.nz/your-heart/how-the-heart-works

Leaf Group, LTD. (2020). 3 Kinds of Exercise that Boost Heart Health. www.hopkinsmedicine.org/. Retrieved November 6, 2020 from https://www.hopkinsmedicine.org/health/wellness-and-prevention/3-kinds-of-exercise-that-boost-heart-health

Libretexts. (2020, June 1). Aerobic Exercise. www.med.libretexts.org. Retrieved November 9, 2020, from https://med.libretexts.org/Courses/Sierra_College/Sierra%3A_NUTF10_(Sheldon)/Text/10%3A_Physical_Fitness/10.2%3A_Aerobic_Exercise

University of Texas. (2020). How to get your Heart Rate Up. www.mdanderson.org. Retrieved November 9, 2020, from https://www.mdanderson.org/publications/focused-on-health how-to-get-your-hear-rate-up