YOUR HIGH SCHOOL

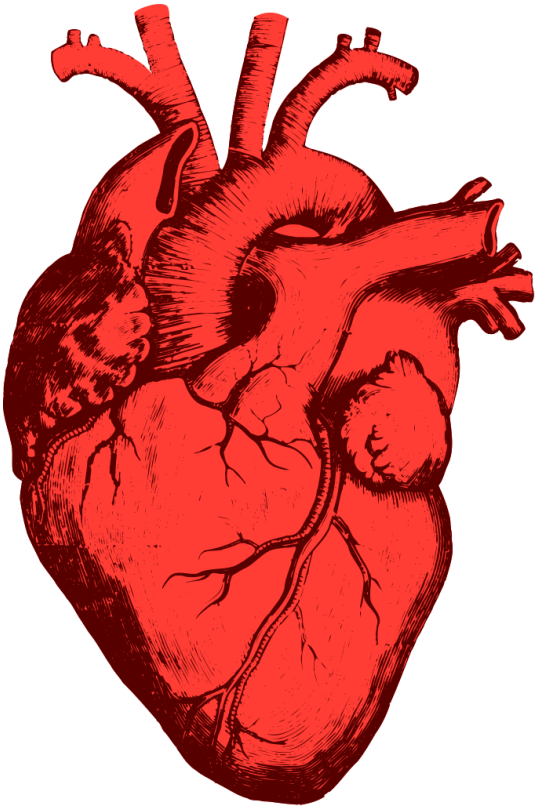
Introduction to Engineering

Technical Report

Stress Analysis

STUDENT's NAME

START DATE

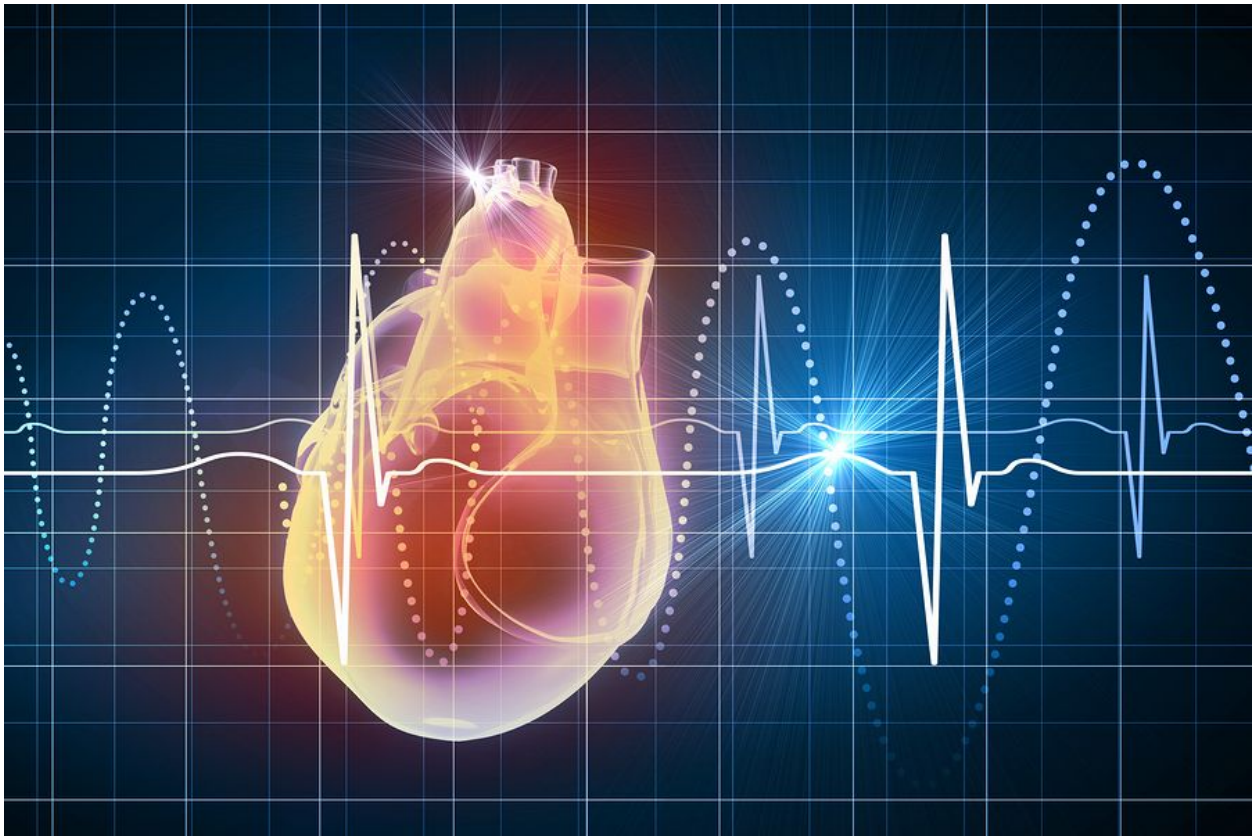


Submit to: INSTRUCTORS NAME

Submitted by: STUDENT'S NAME

Submitted on: DATE

During the 2 week period of this project, our objective was to find out our BPM (Beats Per Minute) while doing various activities. We found our at rest heart rates, our heart rates while climbing stairs and some, and our heart rates while walking a track and some. We were testing to see what would happen to our heart rates when these activities were completed. These tests are called Stress Tests, and are used to find cardiac problems with one's heart. To collect our data, we sent everyone off in groups of two to three people each, and had them conduct 7 different tests, and monitor the time it took them, and their heart rate after doing said activities. First, we had the students take their resting heart rate, then we had them climb the stairs without a backpack and a strolling pace, then with a backpack at a strolling pace, then with a backpack and a more uptempo pace. We had then done similar things out on a track. We then marked our own data and the data of 9 others on a spreadsheet, and made graphs to show our results.



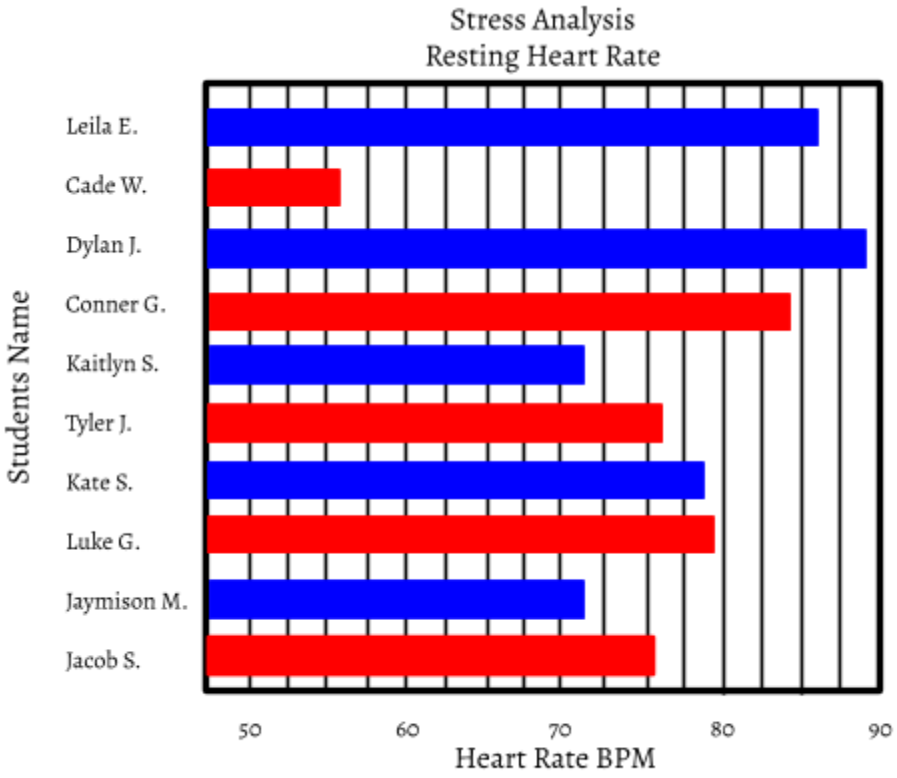
Resting Heart Rate (BPM)

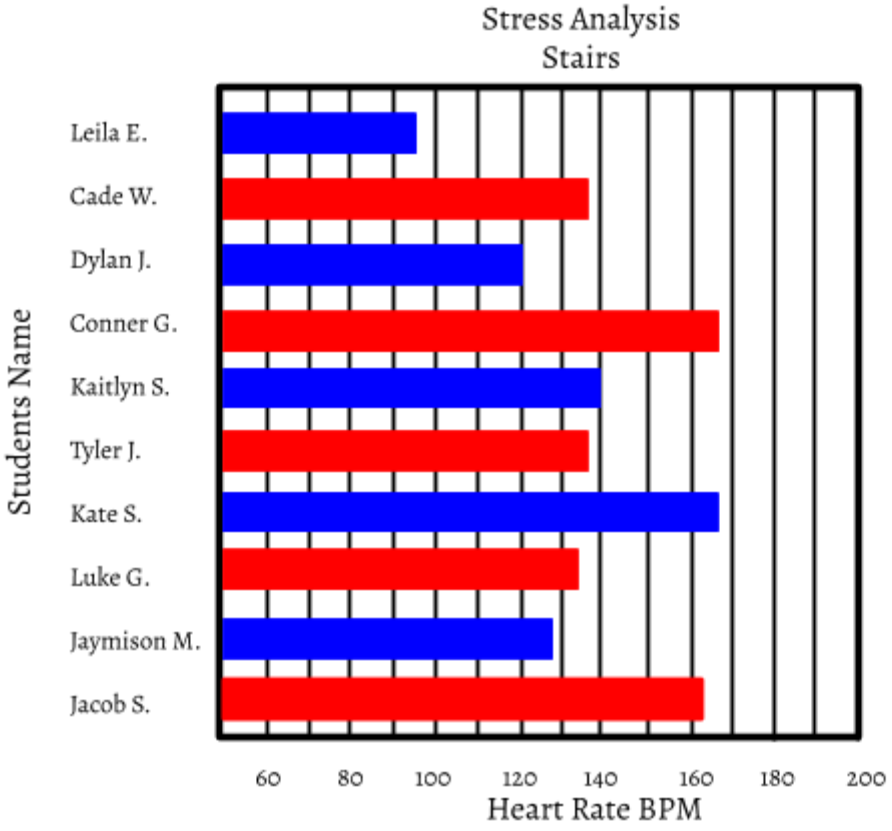
Student's Name	Time It Takes	Heart Rate BPM
Leila E.	0.0	86 BPM
Cade W.	0.0	56 BPM
Dylan J.	0.0	89 BPM
Connor G.	0.0	84 BPM
Kaitlyn S.	0.0	72 BPM
Tyler J.	0.0	76 BPM
Kate S.	0.0	78 BPM
Luke G.	0.0	79 BPM
Jaymison M.	0.0	72 BPM
Jacob S.	0.0	76 BPM

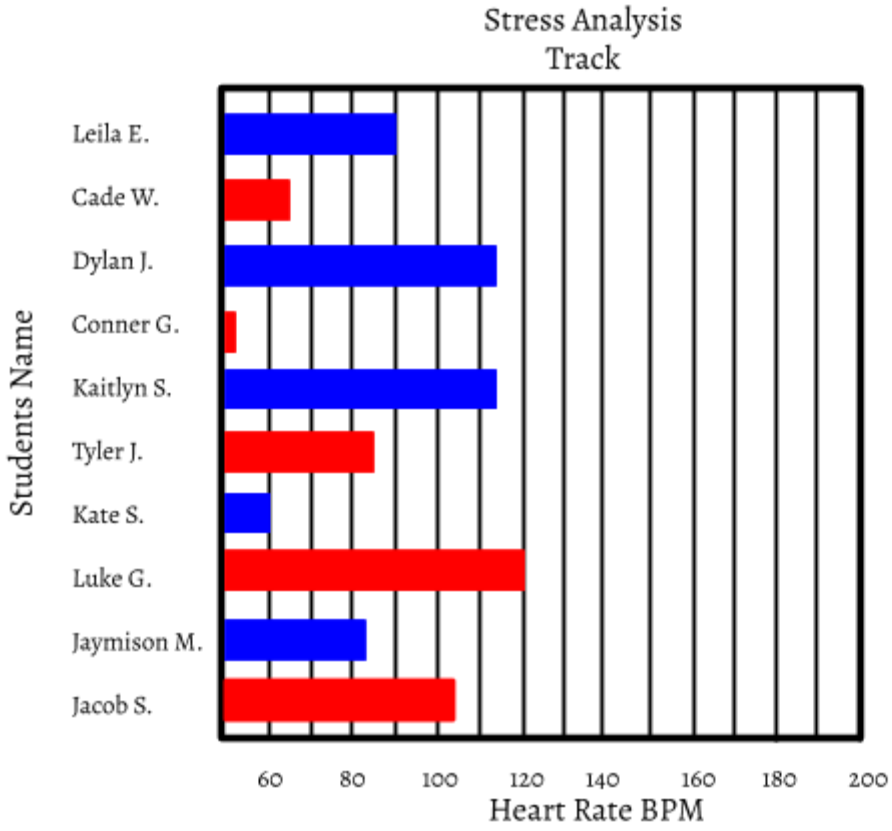
	Stairs No Backpack		Track No Backpack	
Student's Name	Time It Takes	Heart Rate BPM	Time It Takes	Heart Rate BPM
Leila E.	3.53 min	96 BPM	4.01 min	90 BPM
Cade W.	2.11 min	139 BPM	4.01 min	66 BPM
Dylan J.	4.45 min	120 BPM	4.03 min	114 BPM
Connor G.	4.01 min	168 BPM	4.04 min	54 BPM
Kaitlyn S.	3.27 min	140 BPM	4.14 min	114 BPM
Tyler J.	2.38 min	138 BPM	4.00 min	84 BPM
Kate S.	3.54 min	168 BPM	4.15 min	60 BPM
Luke G.	3.54 min	132 BPM	4.13 min	120 BPM
Jaymison M.	4.05 min	128 BPM	4.11 min	82 BPM
Jacob S.	4.49 min	166 BPM	4.12 min	103 BPM

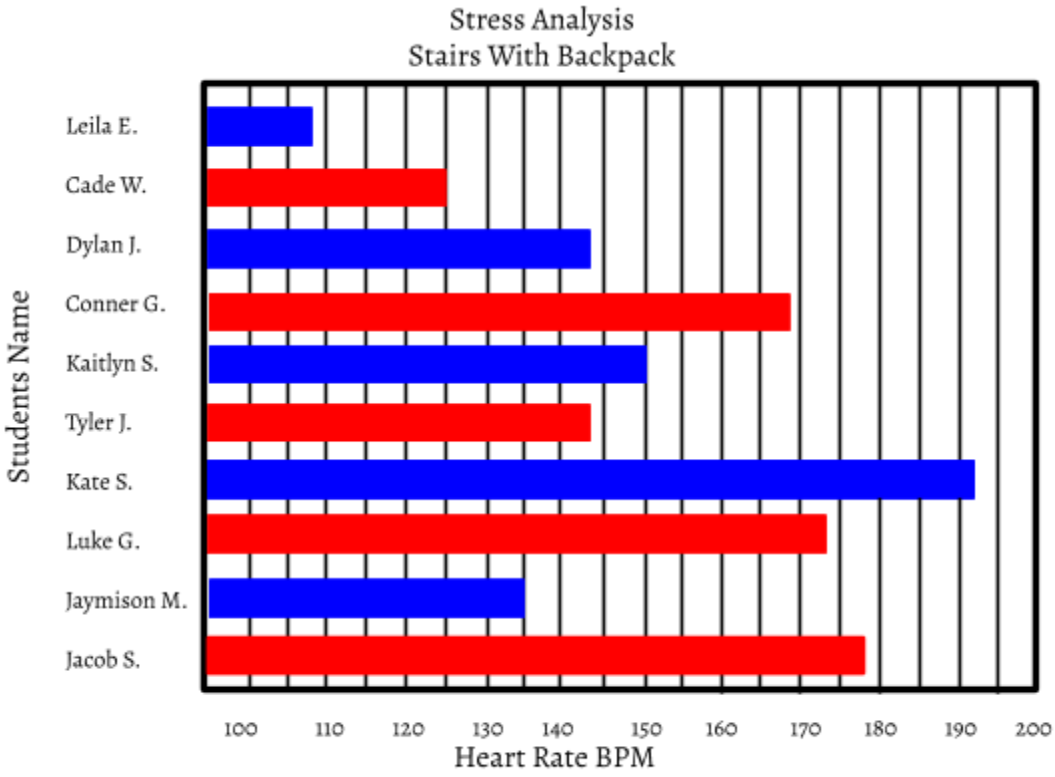
	Stairs With Backpack		Track With Backpack	
Student's Name	Time It Takes	Heart Rate BPM	Time It Takes	Heart Rate BPM
Leila E.	4.22 min	108 BPM	4.23 min	102 BPM
Cade W.	4.13 min	125 BPM	4.24 min	69 BPM
Dylan J.	5.41 min	144 BPM	4.24 min	144 BPM
Connor G.	4.10 min	168 BPM	4.23 min	60 BPM
Kaitlyn S.	4.56 min	150 BPM	4.24 min	132 BPM
Tyler J.	4.30 min	144 BPM	4.26 min	102 BPM
Kate S.	4.03 min	192 BPM	4.31 min	120 BPM
Luke G.	4.57 min	174 BPM	4.07 min	170 BPM
Jaymison M.	5.07 min	135 BPM	4.20 min	91 BPM
Jacob S.	5.25 min	178 BPM	4.42 min	131 BPM

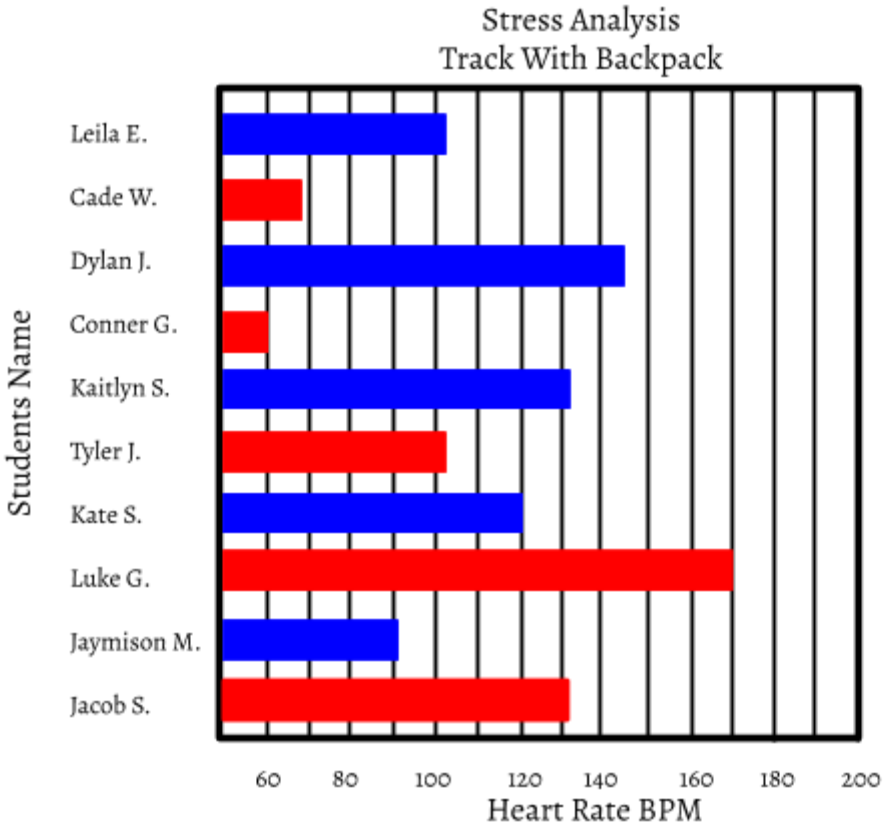
	Stairs With Backpack Late		Track With Backpack Late	
Student's Name	Time It Takes	Heart Rate BPM	Time It Takes	Heart Rate BPM
Leila E.	3.46 min	126 BPM	3.45 min	114 BPM
Cade W.	2.1 min	127 BPM	2.34 min	160 BPM
Dylan J.	3.4 min	162 BPM	4.42 min	150 BPM
Connor G.	4.05 min	186 BPM	4.13 min	144 BPM
Kaitlyn S.	3.3 min	192 BPM	2.12 min	180 BPM
Tyler J.	2.20 min	174 BPM	1.26 min	144 BPM
Kate S.	3.29 min	215 BPM	3.07 min	156 BPM
Luke G.	2.36 min	180 BPM	2.11 min	176 BPM
Jaymison M.	4.58 min	177 BPM	2.30 min	142 BPM
Jacob S.	4.31 min	180 BPM	3.32 min	156 BPM

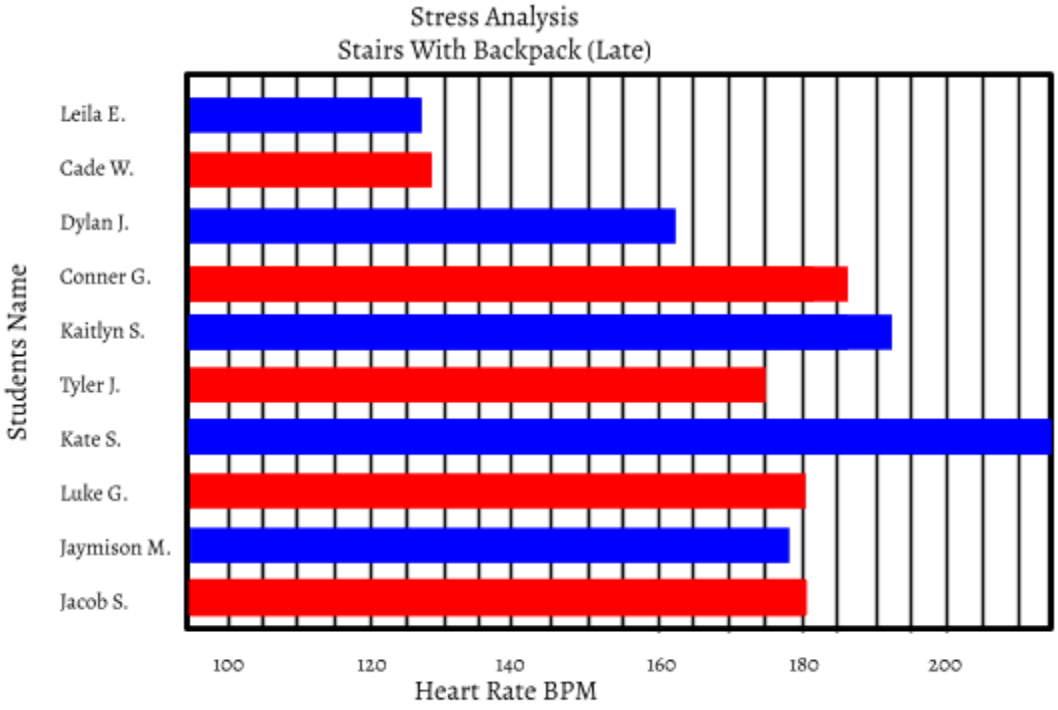

Stress Analysis
Resting Heart Rate
Students Name
Leila E.
Cade W.
Dylan J.
Conner G.
Kaitlyn S.
Tyler J.
Kate S.
Luke G.
Jaymison M.
Jacob S.
50
60
70
80
90
Heart Rate BPM

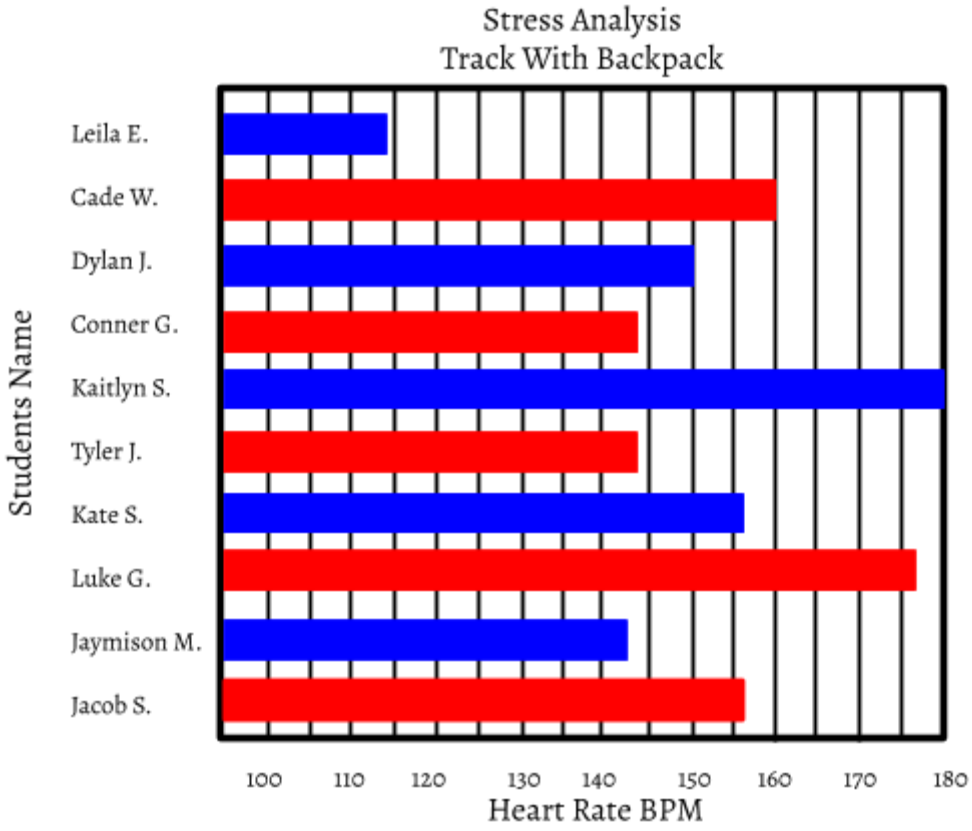

Stress Analysis
Stairs
Students Name
Leila E.
Cade W.
Dylan J.
Conner G.
Kaitlyn S.
Tyler J.
Kate S.
Luke G.
Jaymison M.
Jacob S.
60
80
100
120
140
160
180
200
Heart Rate BPM

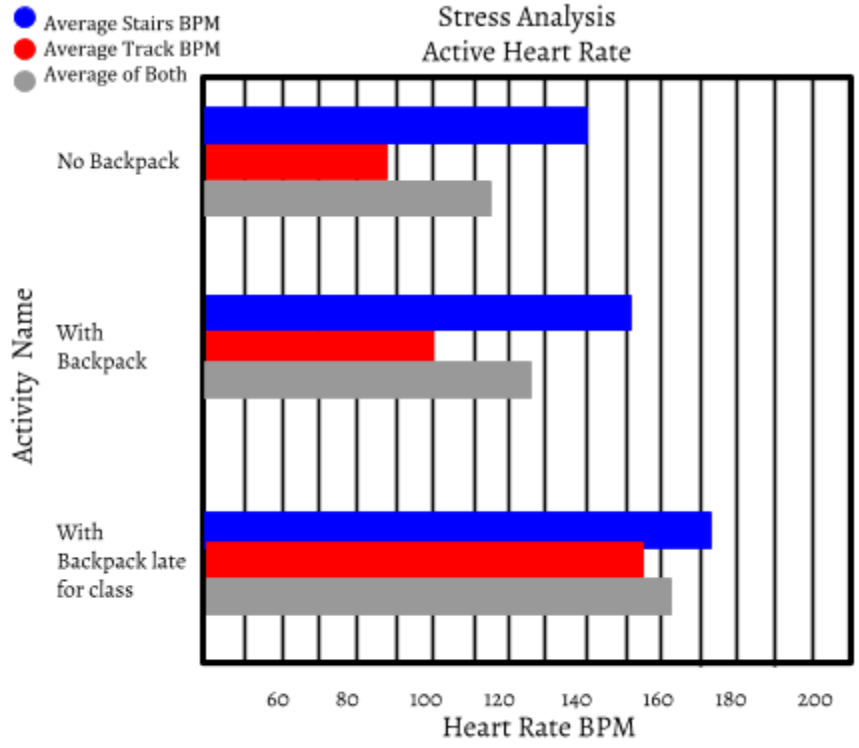

Stress Analysis
Track
Leila E.
Cade W.
Dylan J.
Conner G.
Kaitlyn S.
Tyler J.
Kate S.
Luke G.
Jaymison M.
Jacob S.
Students Name
60
80
100
120
140
160
180
200
Heart Rate BPM


Stress Analysis
Stairs With Backpack
Leila E.
Cade W.
Dylan J.
Conner G.
Kaitlyn S.
Tyler J.
Kate S.
Luke G.
Jaymison M.
Jacob S.
Students Name
100
110
120
130
140
150
160
170
180
190
200
Heart Rate BPM


Stress Analysis
Track With Backpack
Students Name
Leila E.
Cade W.
Dylan J.
Conner G.
Kaitlyn S.
Tyler J.
Kate S.
Luke G.
Jaymison M.
Jacob S.
60
80
100
120
140
160
180
200
Heart Rate BPM


Stress Analysis
Stairs With Backpack (Late)
Students Name
Leila E.
Cade W.
Dylan J.
Conner G.
Kaitlyn S.
Tyler J.
Kate S.
Luke G.
Jaymison M.
Jacob S.
100
120
140
160
180
200
Heart Rate BPM


Stress Analysis
Track With Backpack
Students Name
Leila E.
Cade W.
Dylan J.
Conner G.
Kaitlyn S.
Tyler J.
Kate S.
Luke G.
Jaymison M.
Jacob S.
100
110
120
130
140
150
160
170
180
Heart Rate BPM


Average Stairs BPM
Average Track BPM
Average of Both
Stress Analysis
Active Heart Rate
Activity Name
No Backpack
With Backpack
With Backpack late for class
60
80
100
120
140
160
180
200
Heart Rate BPM

Looking at the data tables and graphs, there were some noticeable differences from the tests run on the track and those run on the stairs. You can see that the stress analysis test taken on the stairs had a higher BPM number than the tests taken on the track, and I believe that it's due to the inclination of the stairs. While going up the stairs, you use energy to go forward, and to pull yourself up to the next step. You also have to turn/wind up and down the stairs multiple times. The opposite could be said for going down the stairs though. While going down the stairs, you can just let gravity run loose and take over, but you're using energy to make sure you don't fall or trip on the way down.

Now any track and field athlete has run the track enough to know that the track is completely flat, and the number of bends/twists you have to go through are a small 2 bends. Comparing these environments, you can tell that it will take less energy to walk the track then 3 flights of stairs up and down. Now you can tell that carrying a backpack around -- which is from 13 to 22lbs, -- takes your heart rate up quite a few notches. For some people, this is a good thing. The added weight puts your heart rate at the perfect place to give you a mini workout, but for others, it can be unneeded added stress. As a highschool student -- a freshman as it is -- you are bombarded with stresses of classes, tests, and homework, and the heavy weight of a backpack is putting too much stress on the heart.

I personally believe that with number of times students have to climb up and down stairs, and how far they have to walk just to get to class, and sometimes they have 4 minutes to get across the school and up 3 floor, backpacks are just an unneeded added stress, but it is convenient for us to carry them around instead of having to go to a locker in between each class. It really depends on the person, but the proof is in the puding, or data.