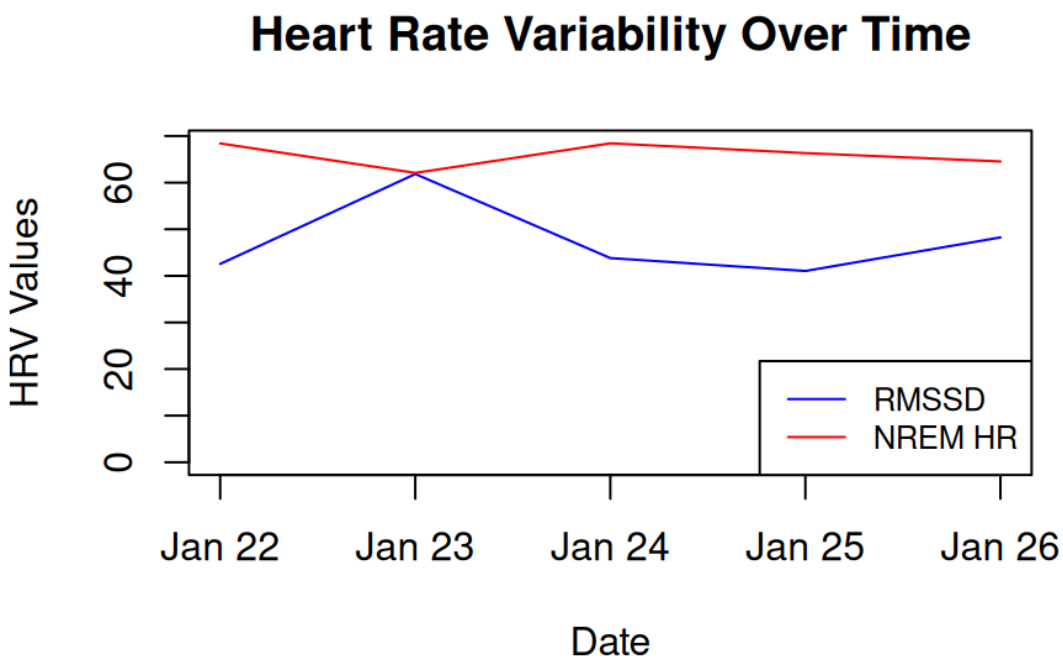
Data Analysis - Internal Loads:

Natalie Cintron

Southern CT State University

CSC 398: Sports Performance Analytics

February 7th , 2026



timestamp	rmssd	nremhr
Min. :2026-01-22	Min. :41.04	Min. :62.08
1st Qu.:2026-01-23	1st Qu.:42.55	1st Qu.:64.54
Median :2026-01-24	Median :43.81	Median :66.33
Mean :2026-01-24	Mean :47.50	Mean :65.96
3rd Qu.:2026-01-25	3rd Qu.:48.24	3rd Qu.:68.41
Max. :2026-01-26	Max. :61.84	Max. :68.44

My own Fitbit data was used for the visualization and data analysis.

According to the *Daily Heart Rate Variability Summary ReadMe.txt* that Fitbit created which was included in the data extraction, here are the definitions of HRV, RMSSD and NREMHR:

"Heart rate variability (HRV) is the physiological phenomenon of variation in the time interval between heartbeats. It is measured by the variation in the beat-to-beat interval.

The "Daily Heart Rate Variability Summary" files include daily granularity recordings of your HRV during a sleep. The description for the values of each row is as follows:

rmssd: **Root mean squared value** of the successive differences of time interval between successive heart beats., measured during sleep.

nremhr: **Heart rate measured during non-REM sleep** (i.e. light and deep sleep stages)."

Analysis:

The data (graph/summary from RStudio) on **rmssd** and **nremhr** indicates that I am managing fatigue well because the **rmssd** values show a moderate level of heart rate variability, which means that I'm not under excessive stress. It's also consistent, so that means that my heart is adapting well to my daily activities.

My average **nremhr** of **65.96 bpm** is normal (AKA it's within healthy range), which means my heart rate is stable during non-REM sleep. This connects with the **rmssd** by maintaining a balance in my daily activities, which lets me have adequate recovery without lots of fatigue.

In conclusion, these metrics imply that my body is recovering effectively from daily stresses, which allows me to maintain energy levels without high fatigue!

Appendix:

```r
#Working directory path way from imported files
setwd(normalizePath("/cloud/project/Weekly_HRV/Weekly_HRV"))
#making data frame
combined_data <- data.frame(
  #custom inputting the date order in so it's in order
  timestamp = c("2026-01-22T00:00:00", "2026-01-23T00:00:00",
                "2026-01-24T00:00:00", "2026-01-25T00:00:00",
                "2026-01-26T00:00:00"),
  #ordering the data accordingly
  rmssd = c(42.548, 61.845, 43.807, 41.037, 48.243),
  nremhr = c(68.413, 62.081, 68.435, 66.329, 64.544),
  entropy = c(2.685, 2.915, 2.695, 2.685, 2.859)
)

# Need to actually make the date be a timestap
combined_data$timestamp <- as.POSIXct(combined_data$timestamp, format="%Y-%m-%dT%H:%M:%S'

# Line plot w the details of rMssd first
plot(combined_data$timestamp,
     combined_data$rmssd,
     type = "l",              # line chart
     col = "blue",
     xlab = "Date",          # X-axis
     ylab = "HRV Values",    # Y-axis
     main = "Heart Rate Variability Over Time",  #title
     xlim = range(combined_data$timestamp),  # limits
     ylim = c(0, max(combined_data$nremhr, combined_data$rmssd)))

# Add lines for nremhr
lines(combined_data$timestamp,
      combined_data$nremhr,
      col = "red")
```

25:28 (Top Level) R Script

```
40
41  # List of renamed files, renamed so its easy for me
42  files <- c("monday.csv", "tuesday.csv", "wednesday.csv", "thursday.csv", "friday.csv")
43  print(list.files())
44  # Iterate through the list of files and combine them
45  for (file in files) {
46    temp_data <- read.csv(file, stringsAsFactors = FALSE)  # Read each CSV file
47
48    if (nrow(temp_data) == 0) {
49      print(paste(file, "is empty."))
50    } else {
51      combined_data <- rbind(combined_data, temp_data)  # Combine the data
52    }
53  }
54  summary(combined_data)
55
56
```

5:28 (Top Level) R Script