**Fitness Data Trends**

**Introduction:**

This analysis examines a data set generated by a user over the course of four months utilizing inputs from the Samsung Galaxy Health Application. Our group sought answers to four questions derived from the data set:

1. **Does an Active Day Increase or Decrease Sleep?**
2. **Does an Active Day Improve Mood?**
3. **Does Consistency in Activity Result in more calories burned?**
4. **Does Consistency in Activity Result in Longer Stretches of Positive Moods?**

Through the use of data frames and visualizations we answered each of these questions. Below you will find the questions asked, the tools used to seek answers and conclusions based on our results.

**Summary Analysis: *Does an Active Day Increase or Decrease Sleep?***

This analysis examines the impact of activity levels on sleep by setting an activity threshold of 3000 steps. A bar chart compares the average total sleep hours for active and inactive days, using red for inactive days and green for active days. The chart includes clear titles, labels, and customized x-tick labels, while the y-axis limit enhances readability. This visualization effectively illustrates whether active days correlate with increased sleep. Additionally, the analysis creates a trendline for daily step counts, plotted alongside the data with appropriate labels. The slope of the trendline provides insights into the relationship between activity levels and sleep quality**.**

**Visual representations include:**

* **A bar plot** comparing average total sleep hours between active and inactive states of the user displaying the average amount of Sleep in hours.
* **A line plot** displaying daily step counts with a trendline. Statistical analysis reveals whether increased physical activity (step counts) is linked to improved sleep quality (total sleep hours). A strong positive correlation would suggest that more active day’s led to better sleep, reinforcing the idea that physical activity may slightly enhance sleep quality.

**Conclusion**

The study concludes that an active day is moderately associated with an average increase in sleep. This indicates that higher levels of physical activity could correlate with improved sleep quality, potentially due to the body's need for recovery after exertion. The Negative slope and low R^2 value in the Trend line suggests this relationship is limited and highlights the importance of consistency of exercise and intensity of rest to optimize health outcomes.

**Summary Analysis: *Does an Active Day improve Mood?***

The question proposed was reliant on input from the user. The two Booleans positioned posed to deliver a concise conclusion to the question. The most effective way was to take a wide view of the lengthier Boolean (Mood) to drill down from that point. Once Mood was viewed and sorted into a pie chart viewing the distribution of Mood, a Histogram was created to compare the Boolean’s of Mood to the Boolean of Active/Inactive.

**Visual representations of the data included:**

* **The Pie Chart** represents a holistic view of Mood inputs over the course of 4 months. Distribution is relatively evenly spread amongst Neutral (28.1%) and Negative (30.2%) while a more significant portion of time was spent holding a Positive Mood State (41.7%). This visualization provides a solid view that we will utilize when drilling down the dataset
* **The Histogram** represents the spread of Mood Placement by Daily Activity with the views being inverted to show a significant output of the Positive Mood Value (300), equal levels of the Neutral Mood (200) output, and a significant drop in the Negative Mood output (100) when the user reports an Active Day, resulting in a stance that an Active day somewhat improves mood.

**Conclusion**

While a high correlation exists between Positive Mood Boolean increase, Negative Boolean decrease and activity, the study found no significant association between activity and Neutral Mood selection. These results dictate further investigation into the variables that influence both Activity Selection and Mood, highlighting pain points that need be addressed in data capture to flush out results, with that focus being on the Neutral Mood Boolean. For now, we can conclude that when the user selects the Boolean choice “Active” their Boolean choice for “Mood” is highly likely to be “Positive”.

**Summary Analysis: *Does Consistency in Activity Result in more calories burned?***

As the subject increased the number of steps, the number of calories burned in some instances increased; however, on some days, the subject didn’t report any calories burned. The days there were no calories burned, despite having as many steps as some days more calories were burned. Active days are defined as when active value is greater than zero.

**Visual representations of the data included:**

* Pie Chart representing the percentage of days the subject was active and inactive
* Box plot shows the distribution of calories the subject burned on active and inactive days. The outliers and medians are represented here
* Histogram represents how many times the subject burned/didn't burn the same amount of calories

Statistical analysis indicates a slight positive correlation between calories burned and level of activity. The calculated mode (0) indicates the subject didn’t burn any calories at all despite being active on certain days. The median calories burned is significantly low (93) as indicated on the histogram.

**Conclusion**

Despite the moderate correlation there is between number of steps (activity), the study found no significant association between activity and calories burned. These results indicate that further study is needed to determine if being more active influences calories burn

**Summary Analysis: *Does Consistency in Activity Result in Longer Stretches of Positive Moods?***

This study explores the connection between consistent physical activity and the duration of positive moods using user data. To analyze this relationship, specific thresholds were established: an activity threshold of over 3,000 steps and a positive mood threshold represented by a mood score greater than 200. From this data, Boolean indicators for "Is Active" and "Positive Mood" were generated, followed by a focus on instances of positive mood.

To examine the data further, streak IDs were assigned based on changes in activity status, which facilitated the calculation of the length of each activity streak. Key findings revealed an average streak length of 3 days, with a total of 32 active streaks. The mean positive mood recorded during these active periods was 1, with streak lengths varying from 1 to 11 days.

**Visual representations of the data included:**

* A bar plot illustrating the relationship between active streaks and positive moods.
* A histogram depicting the distribution of streak lengths.
* A line chart comparing streak lengths and positive moods over time.
* A correlation heatmap showcasing the relationships between positive mood, activity, and streak length.

Statistical analysis indicated a moderate positive correlation (0.4247) between positive mood and streak length, while no correlation (0.0000) was found between activity and streak length. Additionally, the relationship between activity and positive mood was weak (0.1715). The Chi-square test resulted in a statistic of 4.94 with a p-value of 0.55, suggesting no significant association, while a T-test yielded a statistic of 0.0 and a p-value of 1.0, reinforcing the lack of significant difference.

**Conclusion**

While a moderate correlation exists between positive mood and streak length, the study found no significant association between activity and positive mood. These results underscore the necessity for further investigation into the factors that influence both activity levels and mood, indicating potential areas for targeted interventions to enhance overall well-being.