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|  | | DSA-210 FINAL REPORT | | |  | |
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|  | | | SITKI ATABERK KAHRAMAN |  | | |
|  | | | 27913 EFFECT OF DIFFERENT VARIABLES ON BENCH PRESS PERFORMANCE  **SUPERVISED BY** **ÖZGÜR ASAR** |  | | |

**SABANCI UNIVERSITY**

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**WHAT'S IN THIS REPORT?**

The following report analyzes daily habits in their relation to fitness performance, focused on the 1RM Bench Press. For this purpose, three months of data were analyzed with consideration of many parameters that contribute to strength gain. By using statistical methods and visualizations, this work sought to identify main patterns and actionable insights that could permit better optimization of training, nutrition, and recovery.

**Parameters in the Report:**  
**Date:** The date of each daily log.  
**Caloric Intake**: Total calories consumed per day; representative of energy balance.  
**Macronutrient Split**: Protein and carbohydrate consumption; indicative of dietary composition.  
**Creatine Intake**: Daily amount of creatine ingested; relation to performance.  
**Sleep**: Hours and quality of sleep; recovery-based intervention.  
**Mood:** Self-report score (1-10); captures general emotional state.  
**Daily Perceived Difficulty**: Rating scale of the day overall on a 1 to 10 difficulty level.  
**Body Weight**: Morning measurements; used in trend analysis.  
**Bench Press 1RM**: This is the maximum weight for a single repetition of the exercise-the key performance indicator.  
These parameters put forward a great guideline for understanding the interconnected relationship between habits and performance.

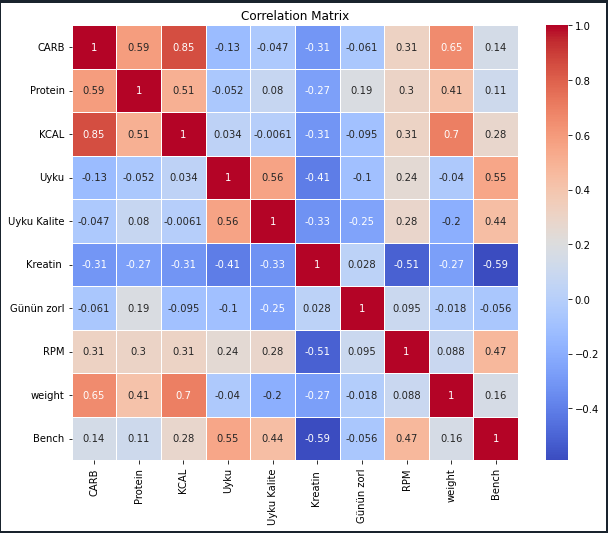
**INTRODUCTION**

This project is to explore the relationship between daily habits and fitness performance, specifically 1RM Bench Press. By tracking caloric intake, macronutrient split, sleep and creatine I’ll be using a data driven approach to optimize strength gains. Through statistical analysis and visualization I’ll be identifying the key factors that contribute to performance improvements and providing actionable insights to make training more efficient and overall better for your body. This is the summary of 3 months of data collection and analysis, bridging the gap between fitness and science.

**WHAT DID I DO?**

In this research work, the study is aimed at understanding the complexities of daily habits and their impact on fitness performance, with one of the key performance indicators being the Bench Press one-rep max (1RM). Over the period of about three months, I maintained an accurate log of different variables including, measuring caloric intake, macronutrient intake (carbohydrates and protein), creatine intake, sleep time and quality, daily perceived difficulty, mood, and body weight. Tracking all these variables consistently would help me infer patterns and relationships on how they connect to my strength gains.  
  
The whole data collection had a well-structured and disciplined nature. Every day, I logged my nutrition intake, calculating the grams of calories consumed, grams of protein and carbohydrates, and any grams of creatine. The time spent asleep was scored both qualitatively on a self-reported scale and in hours. I rated the difficulty of any given day on a scale from 1 to 10, just like my mood, to account for what the subjective aspects may add to the physical performance aspect. I recorded my body weight each day, and the weight during one-rep max in Bench Press, for doing an evolving trend induction and rapid identification of any variation in such variables with respect to their possible effects on strength.  
  
This was indeed not only data collection, but it also consisted of putting data science techniques to draw some insights from the data collected. Once again, Once the data was assembled, it entered the part of cleaning and processing so that it would be sterilized and made uniform. Further, data were subjected to exploratory analysis whereby scatter plots, correlation heat maps, and time series visualizations were generated using Python to elucidate data variables. For instance-caloric manoeuvring along Bench Perfect Performance and whether Higher Sleep Quality correlates with Better Performances demonstrates such analysis.

**1) GRAPHS AND CORRELATIONS**



**Key Observations:**

1. **CARB and KCAL (r = 0.85):** There is a very strong positive relationship between carbohydrate intake and total calorie intake, indicating that carbohydrates significantly contribute to overall calorie consumption.
2. **CARB and weight (r = 0.65):** A moderately positive correlation exists between carbohydrate intake and weight, suggesting that higher carbohydrate consumption may influence weight gain.
3. **Sleep and Sleep Quality (r = 0.56):** There is a positive relationship between sleep duration and sleep quality, suggesting that longer sleep duration may lead to better sleep quality.
4. **Creatine and Bench (r = -0.59):** A moderate negative correlation exists between creatine intake and bench performance. Higher creatine intake might negatively affect bench press performance.
5. **RPM and Bench (r = 0.27):** There is a weak positive relationship between RPM (likely cycling frequency) and bench press performance, though the correlation is not very strong.
6. **Protein and Sleep (r = -0.052):** Protein intake and sleep have almost no relationship, as the correlation is very close to 0.

**General Insights**

There is a strong positive correlation among **KCAL, CARB, and weight,** suggesting that dietary habits strongly impact calorie intake and weight.

The positive relationship between **Sleep and Sleep Quality** highlights the importance of a consistent sleep routine for overall well-being.

**ekran görüntüsü, metin, ekran, görüntüleme, yazılım içeren bir resim

Açıklama otomatik olarak oluşturuldu2)**

**Observation:**

**Lack of clear tendency:**

The points are well distributed all over the graph without any upward or downward trend. We can understand that it shows there's no strong linear relationship existing between protein intake and performance in the bench press.

**Concentration at Higher Protein Intake:**

They seem to crowd some area at 120-140g intake, where the statements differ quite broadly concerning the bench press, from about 85kg up to over 100kg.

**Clear Performance Variability:**

With the same protein intake, bench press performance varies. For example, at about 100g of protein, it would show a performance of 70kg right up to over 100kg.

**Understanding:**

It simply means that protein only might not have a big weight as one of the factors that count in determining performance at bench press settings. Other things would include intensity in training, experience, or nutrition in general.

A more thorough analysis, including various other variables such as Calories intake, exercise frequency, and rest, would clarify understanding of the relationship.

**ekran görüntüsü, metin, ekran, görüntüleme, diyagram içeren bir resim

Açıklama otomatik olarak oluşturuldu**

**3)  
UNDERSTANDING**

The level of carbohydrates consumed does not, therefore, portray an ideal linear association concerning the bench press performance. Judging by the performance data, it indeed varies significantly over the range of consumption levels of carbohydrates, indicating that the amount of carbohydrate consumed is probably insignificant concerning bench press strength. Performance varied quite considerably depending on how much carbohydrates were consumed; training or perhaps diet components would be among other factors.

**metin, ekran görüntüsü, çizgi, diyagram içeren bir resim

Açıklama otomatik olarak oluşturuldu4)**

**UNDERSTANDING**

This chart shows that **bench press performance** improved steadily from October to early December, peaking above 105 kg. However, a noticeable decline occurred afterward, possibly due to fatigue or reduced trainingi intensity or less kalory comsumption **Body weight** remained stable throughout, indicating that strength gains were not linked to weight changes.

**5)**

ekran görüntüsü, metin, diyagram, dikdörtgen içeren bir resim

Açıklama otomatik olarak oluşturuldu

**UNDERSTANDING**

This box plot describes the connection of sleep quality (X-axis) and repetitions per minute (RPM) (Y-axis).

**Low sleep quality (0-4):**  
rpm values lower and more closely matched and vary little from each other. Poor sleep seems to limit performance.

**Moderate sleep (5-6):**   
RPM tends to increase with a wider meet of figures, showing better performance with a good quality of sleep.

**High sleep quality (7-9):**   
The highest RPM values of a wider spread have been processed. Better sleep is associated with better and varied performance.   
Finally, the higher quality of sleep is usually an aide to better performance in RPM underlining adequate sleep needed for best physical performance.

diyagram, metin, ekran görüntüsü, dikdörtgen içeren bir resim

Açıklama otomatik olarak oluşturuldu

**6)**

**UNDERSTANDING**

The boxplot demonstrates the relationship between 'day difficulty’- presented on the x-axis- and the performance in bench press- presented on the y-axis.

**During low Day Difficulty (2-4):**

Bench press performance tends to hover around 85-95 kg with variation among the many measures.

Easy Days are perceived to provide a consistent level of performance.

**Moderate Day Difficulty (5-7):**

In this case, a wider range of performance on bench produces some strange results on the minimum side.

Increased day performance variability may depend on fatigue or increased strain that accompanies the tougher training day.

**High Day Difficulty (8-9):**

Essentially, performance score wis otherwise very high, but less consistent than moderate ones since performance on such days is always difficult.

In spite of such difficult days, some people maintain their performance at a higher level.

**Conclusion**

The type of variance in the bench press performance depends on the difficulty of the day. Moderate to high difficulty days were found varied more than the other days, which indicates that outside stress or exertion from physical exertion have contributed to the consistency of strength. Days of less difficulty were found to yield stable performance.

**ekran görüntüsü, diyagram, öykü gelişim çizgisi; kumpas; grafiğini çıkarma, çizgi içeren bir resim

Açıklama otomatik olarak oluşturuldu7)**

The above line graph represents the weekly calorie intake on the Y-axis and the time spent on the X-axis.

Inhibitions:

**Early Increase (October-November):**

There is a gradual rise in calorie intake until early November to reach a peak of about 3500 kcal, which could indicate increased consumption.

**Fluctuations (November):**

It remains highly variable calorie daily intake after it reaches the peak, showing some mobility in dietary or activity-related alterations.

**Declines and Stabilities (Late November to December):**

At the end of November, a significant drop occurs, then calorie intake levels off by the middle of the month to 2000-2500 kcal.

A very sharp drop seems to happen for a very short period, involving a specific low-caloric day or event.

**Conclusion:**

Periods of elevation, fluctuations, and reductions in calorie intake over a period of time-such time may correspond to training intensity, need for recovery, or diet change. Period checks can enable one to know the optimal quantity of intake to be performance and energy balance.

**CAN IT BE BETTER?**

This project could have been markedly better had certain limitations been addressed. Poor funding made it impossible to utilize superior data collection tools such as professional monitoring devices or laboratory tests that could have improved the precision and depth of the analysis. Small sample sizes reduced the generalizability of findings, restricting how effects could be tested across various groups at different points. Additionally, time limitations restricted the lengths of data-capture windows and further analyses, impeding the potential for this project. This research would have been a more wide-ranging exercise with better fiscal backing, larger participant samples, and extended time frames.

**FINAL WORDS**

**Final statement**

This project served as a school of information about the interface between nutrition, training, and good performance. The salient points include:

**Nutrition and Performance:**

Caloric intake and intake of macronutrients (carbs, protein) were differently related to performance measures such as bench press. Energy balance was heavily influenced by calories and carbs, but the effect of protein on strength performance was more moderate and unclear.

**Recovery and Sleep**:

Across a range of studies, important sleep quality proved to be an important factor influencing physical performance, particularly during the execution of consistent RPM (repetitions per minute). Better sleep quality showed stronger recovery.

**Variability in Training:**

Influences stranger from factors like daily difficulty have been cited as affecting bench performance. Performance variability indicated that either a balance of training intensity with recovery should be applied as well.

**Caloric Trends:**

The energy measure was also affected weekly through these training phases to stay healthiest and peak at higher intensities, then drop towards the end. This illustrates how nutrition dynamically serves the performance requirements of training.

**Conclusion**

A more general statement would emerge that training, nutrition, and recovery should interrelate very well. Even as they all tend to contribute performance-wise, they still have a different interaction when it comes to determining overall performance. Continuous monitoring and adjustments are essential towards optimizing results and sustaining progress in the long run.