Lifestyle Factors and Dementia Risk

Proposal: Understanding Lifestyle Factors and Dementia Risk

This presentation will explore how different lifestyle factors—such as alcohol consumption, physical activity, smoking, and diet—may correlate with the risk of developing dementia. By analyzing the provided dataset and examining how these habits interact with each other, our aim is to determine if there is a correlation between certain behaviors and an increased or decreased likelihood of dementia. The goal of this project is to identify potential risk factors based on the data, while noting that our analysis is focused on finding correlations, not proving cause and effect

Hypothesis: If individuals adopt healthier lifestyle choices, then the risk of developing dementia could potentially be mitigated.

Proposal Motivation

Our team felt strongly about exploring the relationship between lifestyle factors and dementia risk. This topic holds personal significance for several of us, as we have family members or friends who have been impacted by this disease. Furthermore, one of our team members has developed an app related to dementia, which sparked a passion for leveraging data analytics to better understand this complex issue. We believe that by analyzing the provided dataset, we might be able to understand if there are potential risk factors associated with dementia.

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Data Collection and Analysis

1

Data Collection

2

Data Cleaning

3

Statistical Analysis

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Our Process

1

1. Task Division and Code Development

For this project, we first divided our tasks and answered specific questions using Python code.

2

2. Collaboration and Resource Sharing

We collaborated with each other throughout the process, sharing ideas and resources.

3

3. Overcoming Challenges

We faced some unexpected challenges, such as discovering that our data revealed a different story than we anticipated about the correlation that some lifestyle factors had with dementia.

4

Key Successes

Despite these challenges, we achieved several key successes, including a deeper understanding of the dataset and understanding that the patients in this dataset seem to have some correlation with other factors besides the ones we mentioned in our hypothesis.

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Nutrition & Dementia

1

The chi-square test

Shows there is no statistically significant association between Nutrition Diet and Dementia

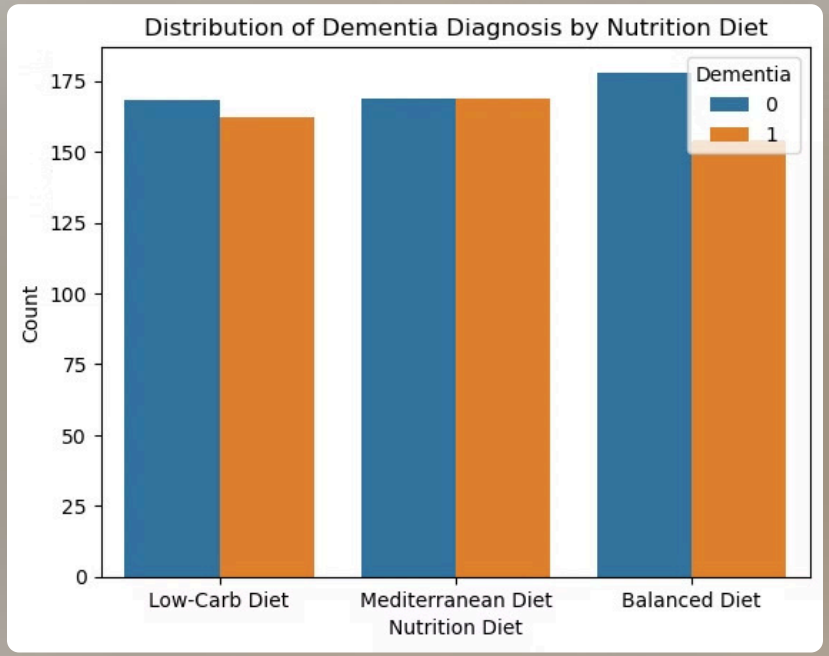
2

Mediterranean Diet:

Seems to have the lowest dementia diagnosis rate

3

Low-Carb Diet and **Balanced Diet** show higher rates of dementia diagnosis, with the Balanced Diet showing a particularly high rate in this sample.



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Family History & Dementia

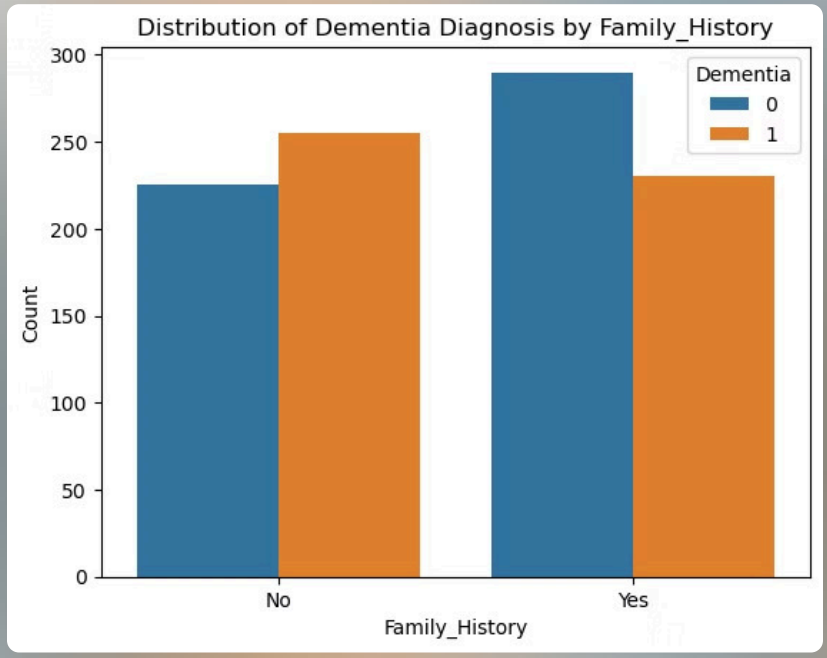
1

2

The chi-square test

The chi-square test evaluates the association between **Family_History** and **Dementia**. The results give a **Chi-square statistic of 7.55311** and a **p-value of 0.00599**, which is less than 0.05.

There is a statistically significant association between **Family History** and **Dementia**. This implies that a family history of dementia is significantly associated with an increased likelihood of dementia diagnosis.



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Sleep Quality & Dementia

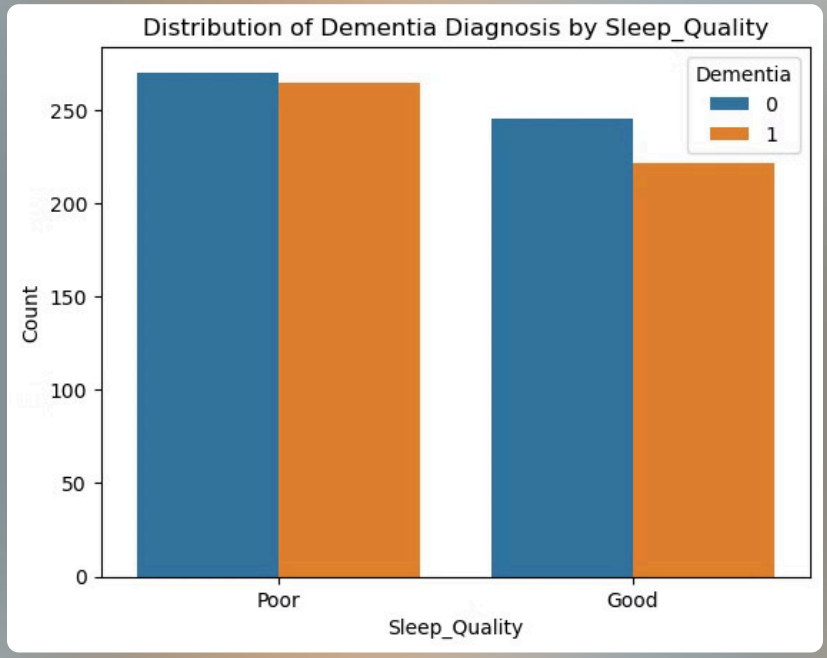
1

The chi-square test

The chi-square test evaluates the relationship between **Sleep Quality** and **Dementia**. The results yield a **Chi-square statistic of 0.32725** and a **p-value of 0.56728**, which is greater than 0.05.

2

There is no statistically significant association between **Sleep Quality** and **Dementia**. Therefore, in this dataset, sleep quality does not appear to play a significant role in dementia diagnosis.



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Alcohol Consumption and Dementia

Low Alcohol Group

Alcohol consumption levels between 0 and 0.05.

About **49.5%** of individuals in this group have dementia.

Moderate Alcohol Group

Alcohol consumption levels between 0.05 and 0.15.

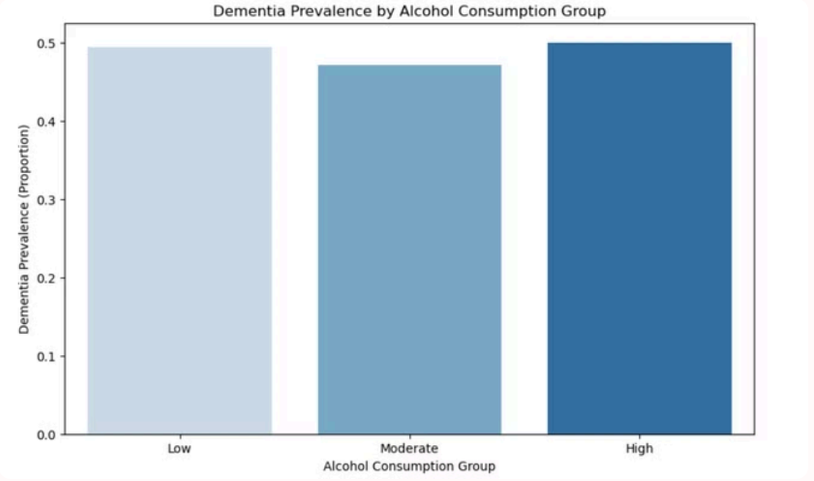
About **47.1%** of individuals in this group have dementia.

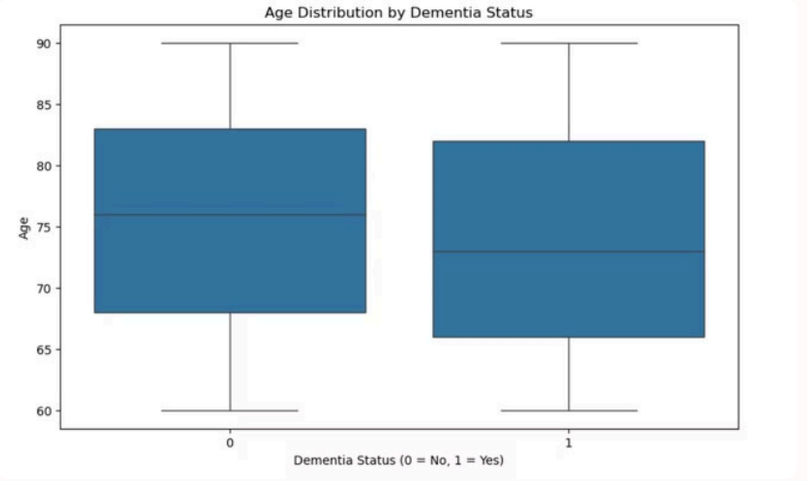
High Alcohol Group

Alcohol consumption levels above 0.15.

50.0% of individuals in this group have dementia.

- The prevalence of dementia is remarkably similar across all alcohol consumption categories.
- The data shows that alcohol consumption levels do not appear to be a significant predictor of dementia. Other health factors, such as family history, physical activity may play more critical roles in dementia onset.
- Age is also consistent across groups, meaning the similar dementia prevalence cannot be attributed to age differences.





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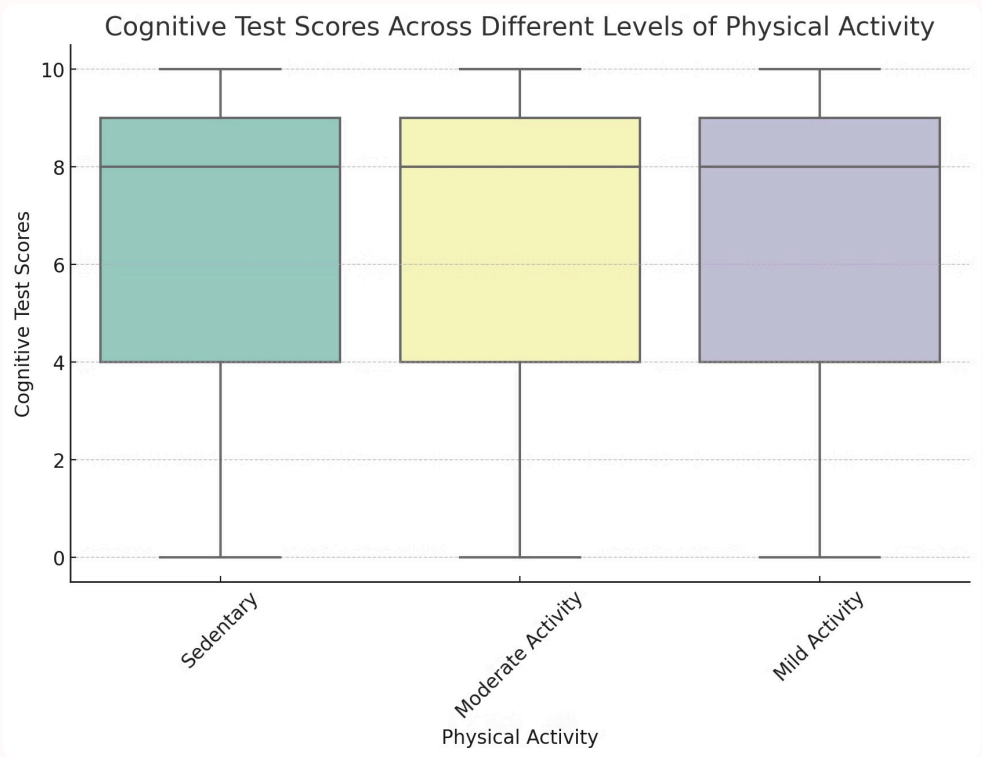
Impact of Physical Activity and Smoking on Cognitive Test Scores

The effect of smoking status on cognitive scores could differ across physical activity levels, with more active individuals possibly having better scores, despite their smoking habits.

Physical Activity

Moderate activity leads to higher scores. Physical activity boosts cognition.

Sedentary and mild groups show lower scores. Less activity links to poorer performance.

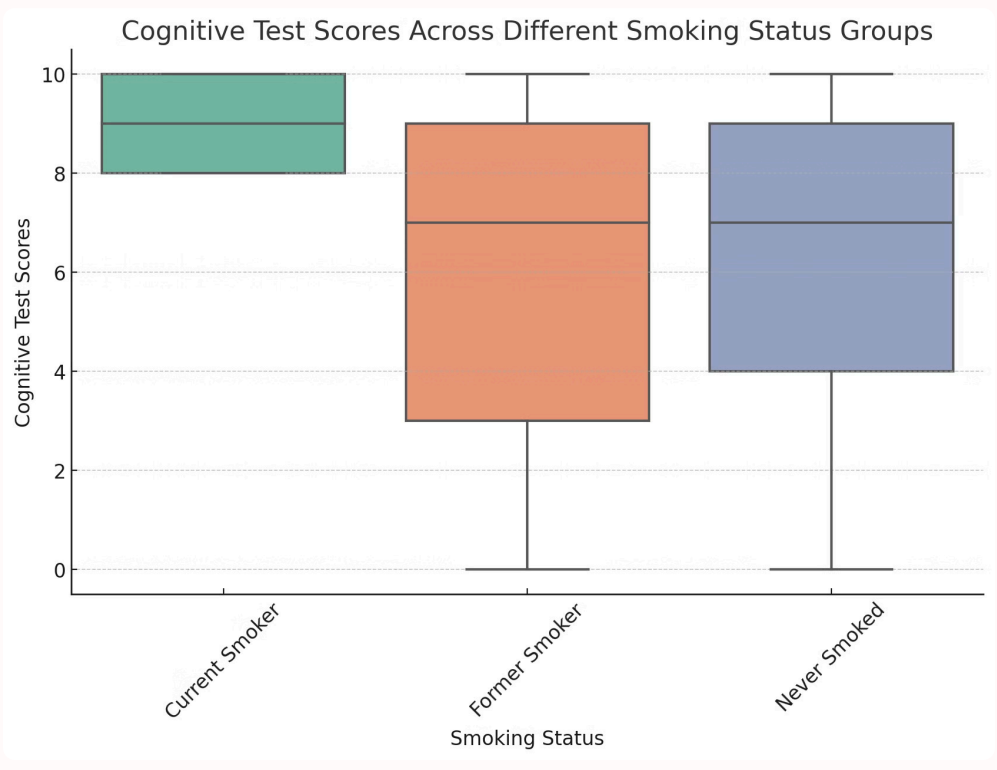


Smoking

Never smokers score higher. Non-smokers perform better.

Current smokers score lower. Broader score range.

Former smokers score low. Narrower range.

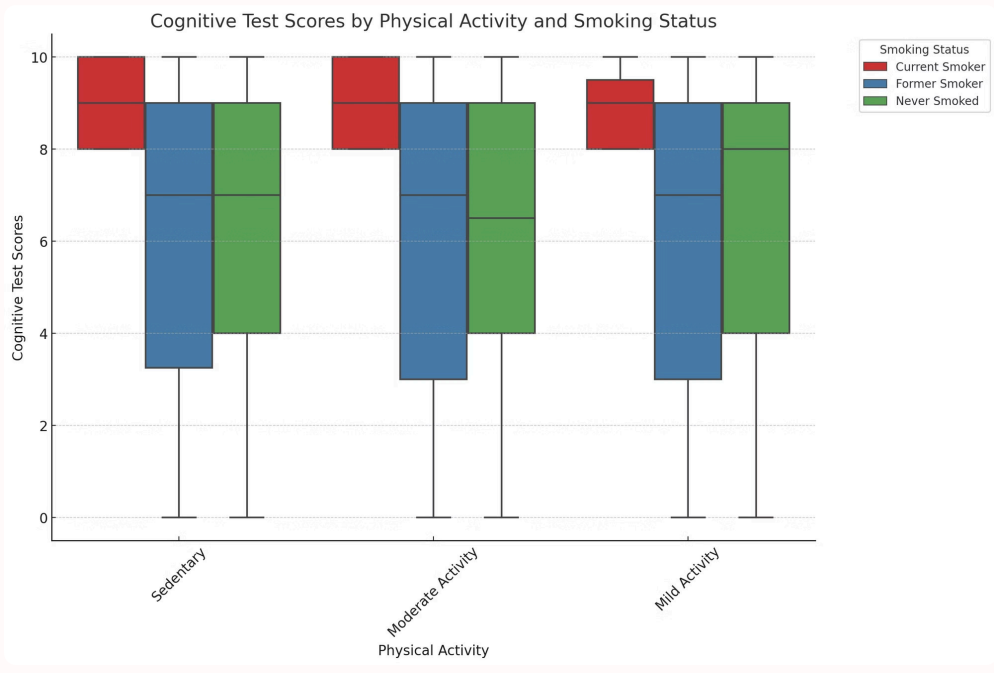


Cognitive Test Scores

Never smokers perform best. All activity levels included.

Sedentary or mild smokers score lowest. Low activity and smoking worsen scores.

Moderate activity boosts scores. Even smokers perform better. Physical activity helps mitigate decline.



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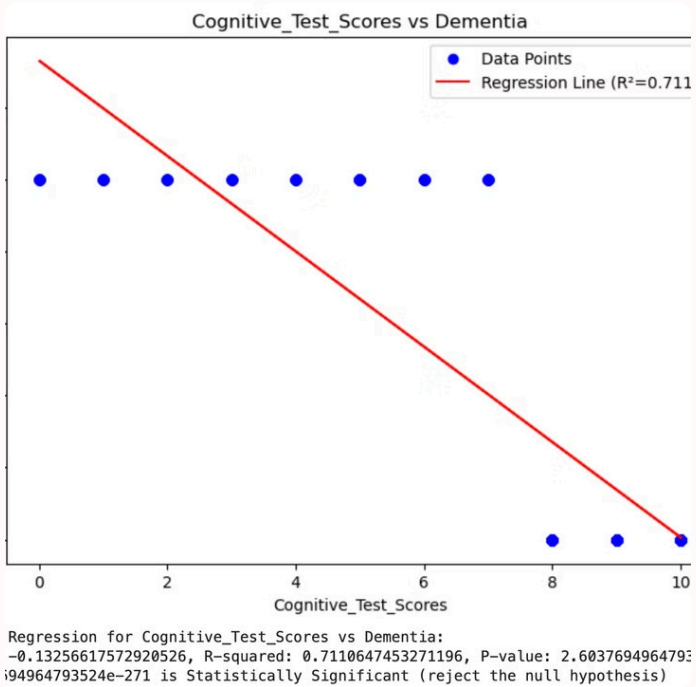
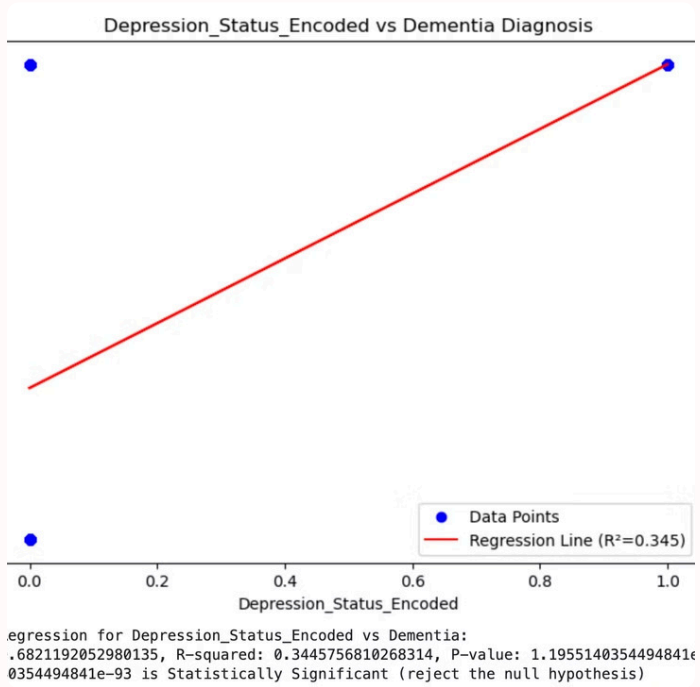
Overall Key findings and Observations

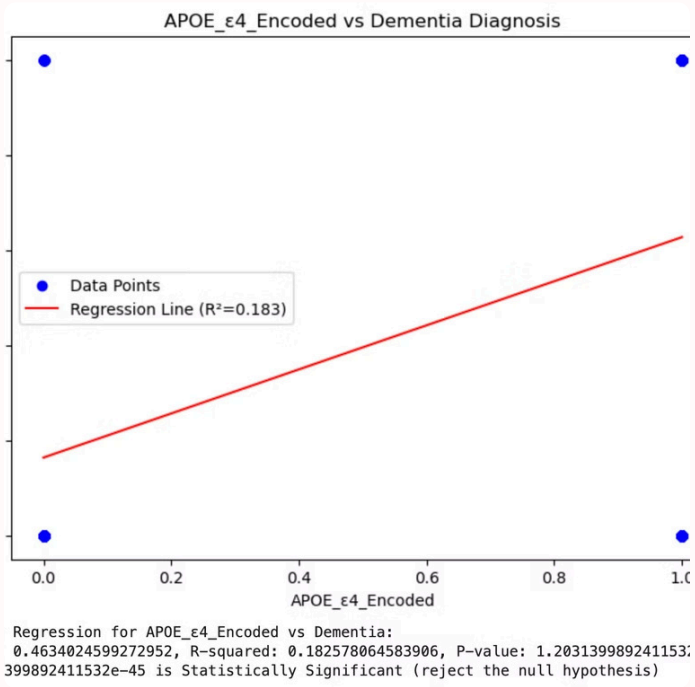
Based on the previous findings, we looked at other factors and these are our findings and observations looking at the overall dataset.



Regression for Cognitive_Test_Scores vs Dementia:
−0.13256617572920526, R-squared: 0.71106474532711 96, P-value: 2.6037694964793
94964793524e−271 is Statistically Significant (reject the null hypothesis)



egression for Depression_Status_Encoded vs Dementia:
.6821192052980135, R-squared: 0.3445756810268314, P-value: 1.1955140354494841e
0354494841e−93 is Statistically Significant (reject the null hypothesis)



Regression for APOE_ε4_Encoded vs Dementia:
0.4634024599272952, R-squared: 0.182578064583906, P-value: 1.203139989241153
399892411532e−45 is Statistically Significant (reject the null hypothesis)

Cognitive Test Scores

Depression Status

APOE_ε4

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Healthy Choices for Brain Health

While our findings didn't show strong correlations between healthy lifestyle choices and the prevention or mitigation of dementia, we believe these factors can still contribute to better overall brain health.

Lifestyle factors such as diet, physical activity, smoking, and alcohol consumption showed weaker correlations with dementia in this dataset, suggesting that their direct impact on dementia risk is less clear. However, it's important to remember that embracing a healthy lifestyle can still empower you to enhance your cognitive well-being and support long-term brain health. It's never too late to make positive changes for your mind and body.

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Breakdown of tasks and roles

1

Paige Andrews

Part 1: responsible for Data Overview.

2

Feda Zidan

Part 2: hosted the main repository, and responsible for Nutritional Diet, Family History, Sleep Quality and Dementia Diagnosis visualization.

3

Patricia Macaspac

Part 3: responsible for Alcohol Consumption and Dementia visualization.

4

Lakshay Garg

Part 4: responsible for Physical Activity, Smoking, Cognitive Test Scores and Dementia visualization.

5

Nathaly lamas

Part 5: responsible for the Statistical Analysis.

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