

Overstimulation and Lifestyle Report Analysis: Insights and Recommendations

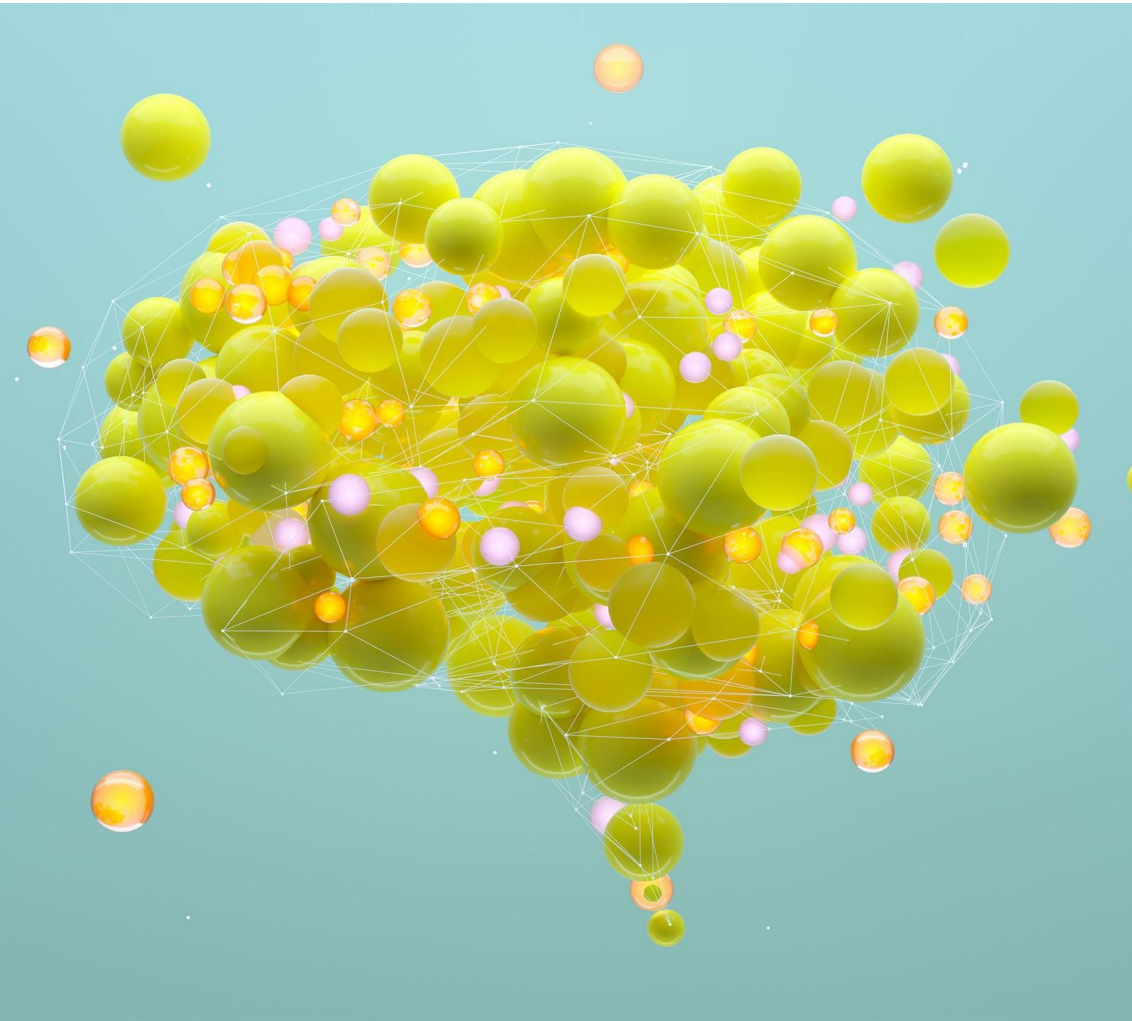
*Understanding what factors contribute to
overstimulation.*



Agenda Overview

- Definition and Problem Statements
- Effects of Overstimulation
- Data Collection and EDA
- Sectioning the Dataset
- Selection of Machine Learning Algorithms
- Features Influencing Overstimulation
- Summary Findings
- Recommendations and Conclusions

Definition and Problem Statement



Understanding Overstimulation

Overstimulation occurs when the brain receives more sensory input than it can process effectively, leading to feelings of overwhelm.

Overstimulation Detection Dataset was retrieved from Kaggle to predict the likelihood of individuals experiencing overstimulation based on various lifestyle and behavioural factors.

Problem Statement

Overstimulation can be caused by excessive sensory input, mental overload, social interactions, or environmental factors such as noise.

The goal is to identify such factors that strongly contribute to overstimulation and to train machine learning models that predict overstimulation based on various lifestyle factors.



Effects on Physical and Mental Health

Manifestations of Overstimulation

Overstimulation can lead to mental health issues such as anxiety, fatigue, and sleep disturbances, affecting overall well-being.

Physical Health Effects

Chronic overstimulation can result in increased heart rates and stress-related physical conditions, requiring attention and management.

Need for Intervention

Addressing the effects of overstimulation is crucial for improving both physical and mental health in individuals.

Overview of Collected Data

The data was collected from [Kaggle](#).

The dataset contains 2000 records and 20 columns of features including a binary target variable (Overstimulated), indicating 1 for Overstimulated and 0 for Not Overstimulated.



```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2000 entries, 0 to 1999
Data columns (total 20 columns):
 #   Column                      Non-Null Count  Dtype  
---  -
 0   Age                        2000 non-null   int64  
 1   Sleep_Hours                2000 non-null   float64 
 2   Screen_Time                2000 non-null   float64 
 3   Stress_Level               2000 non-null   int64  
 4   Noise_Exposure             2000 non-null   int64  
 5   Social_Interaction         2000 non-null   int64  
 6   Work_Hours                 2000 non-null   int64  
 7   Exercise_Hours             2000 non-null   float64 
 8   Caffeine_Intake            2000 non-null   int64  
 9   Multitasking_Habit         2000 non-null   int64  
10  Anxiety_Score              2000 non-null   int64  
11  Depression_Score           2000 non-null   int64  
12  Sensory_Sensitivity         2000 non-null   int64  
13  Meditation_Habit           2000 non-null   int64  
14  Overthinking_Score         2000 non-null   int64  
15  Irritability_Score         2000 non-null   int64  
16  Headache_Frequency         2000 non-null   int64  
17  Sleep_Quality              2000 non-null   int64  
18  Tech_Usage_Hours           2000 non-null   float64 
19  Overstimulated             2000 non-null   int64  
dtypes: float64(4), int64(16)
memory usage: 312.6 KB
```

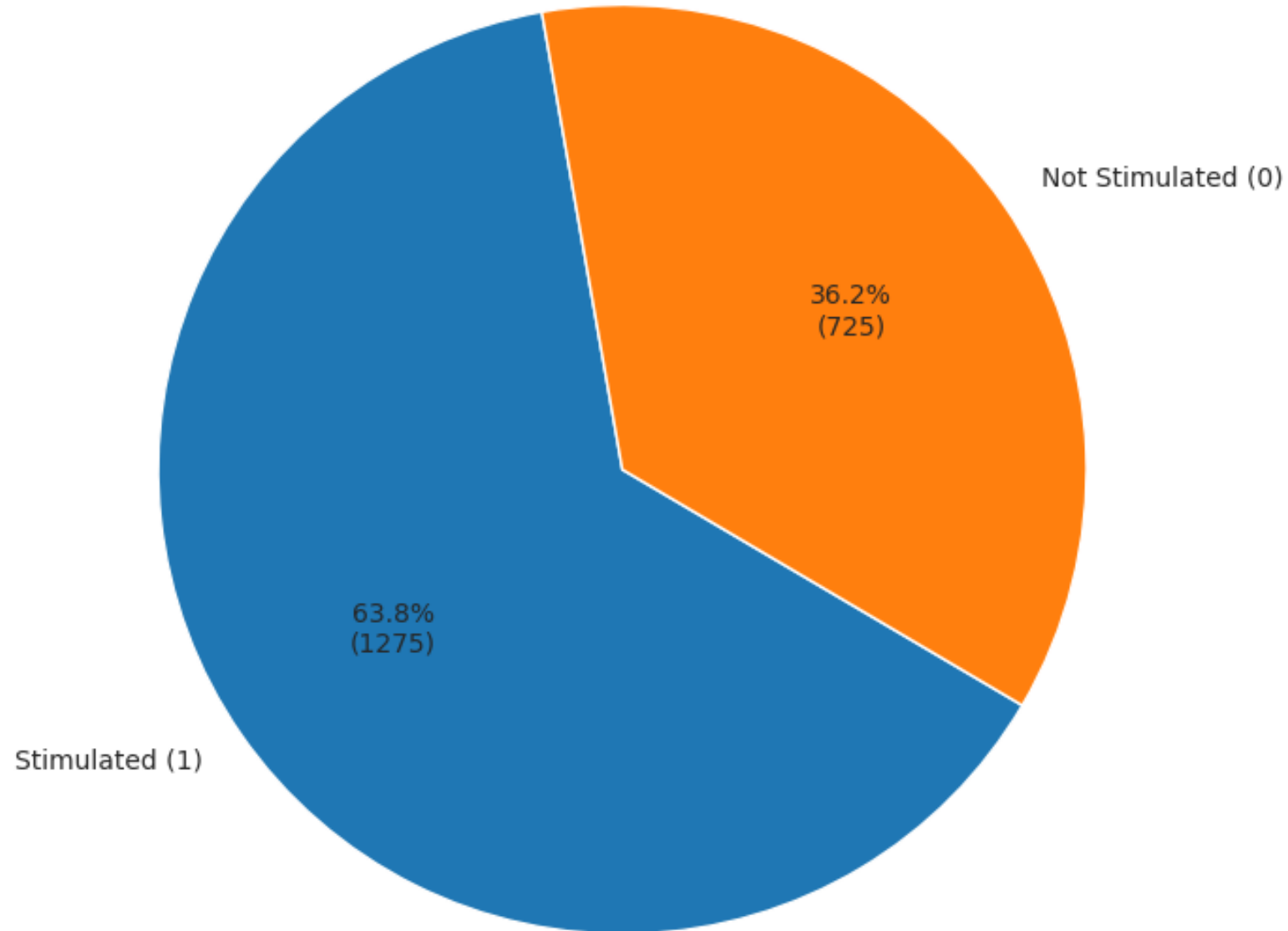
```
# reading the dataset
```

```
df = pd.read_csv('/content/drive/MyDrive/Colab Notebooks/overstimulation_dataset.csv')
df.head()
```

	Age	Sleep_Hours	Screen_Time	Stress_Level	Noise_Exposure	Social_Interaction	Work_Hours	Exercise_Hours	Caffeine_I
0	56	7.767825	4.908517	2	0	8	11	2.054411	
1	46	4.270068	8.413936	9	4	4	10	2.513216	
2	32	6.676144	1.688213	5	2	8	12	2.123108	
3	25	7.963324	3.315576	7	2	8	13	1.217663	
4	38	3.748138	9.899260	5	0	5	4	0.093407	

Exploratory Data Analysis (EDA)

There are more overstimulated individuals (63.8%, 1272) than not stimulated (36.2%; 725)

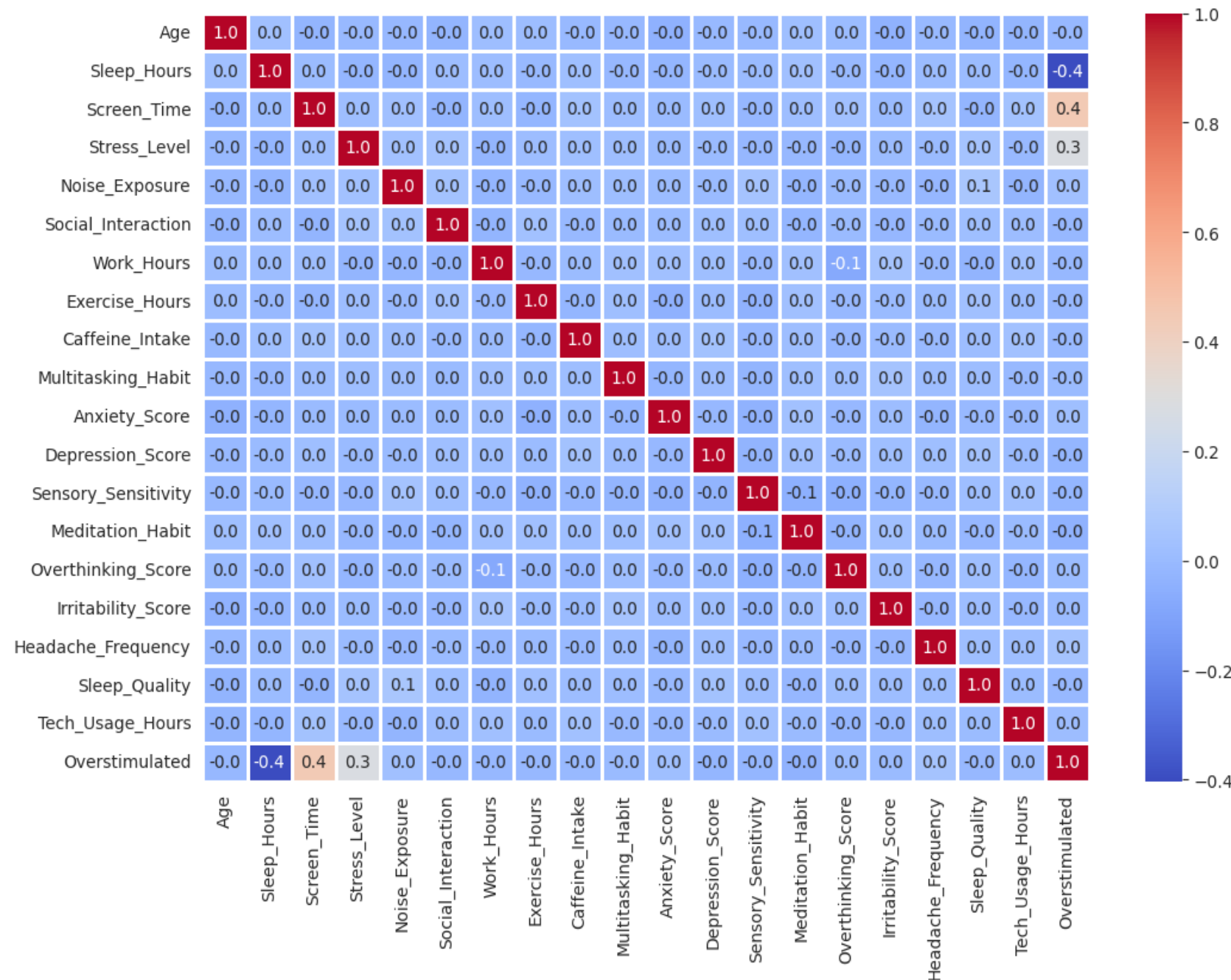


Exploratory Data Analysis (EDA)

Analyzing Lifestyle Factors

The features were explored to understand their influence on overstimulation and overall well-being.

According to the correlation heatmap, there is a mild negative correlation between Overstimulated and Sleep Hours (-0.4), and a reverse case for Screen Time (0.4)

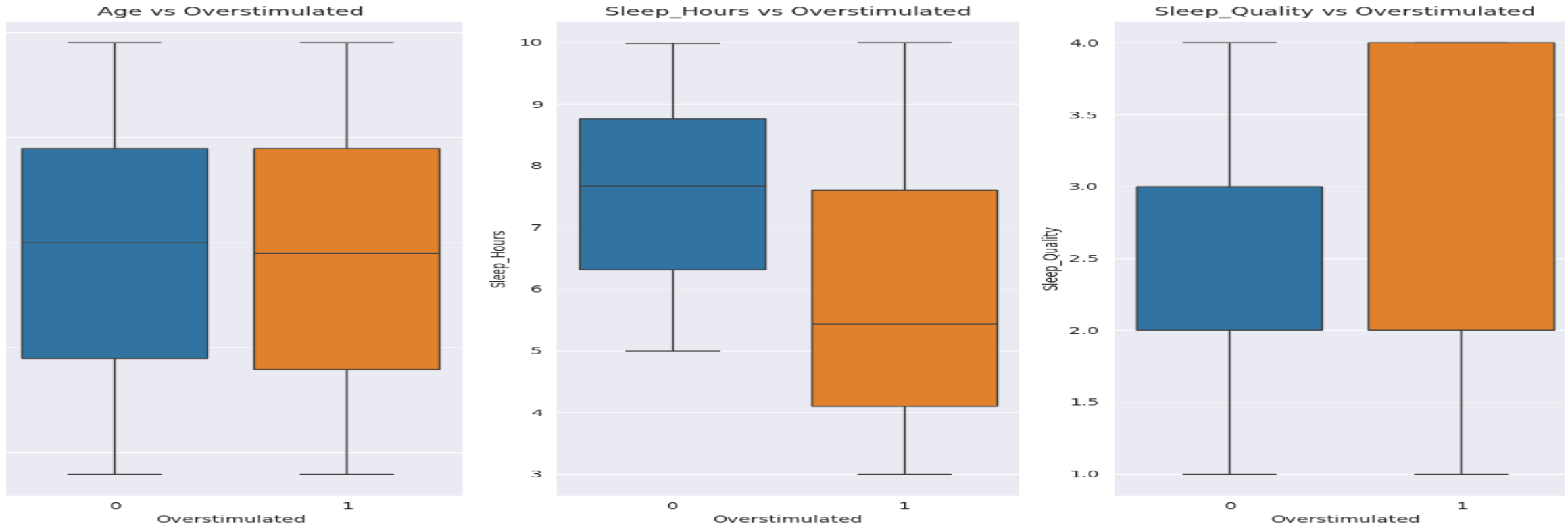


Sectioning the Dataset based on Similarities

- **Demographics & Rest:** Age, Sleep Hours, Sleep Quality
- **Mental Health Scores:** Anxiety_Score, Depression_Score, Overthinking_Score, Headache Frequency, Irritability Score
- **Habits & Exposures:** Multitasking_Habit, Meditation_Habit, Social Interaction, Screen Time, Stress Level, Noise Exposure, Work Hours, Tech Usage, Sensory Sensitivity, Caffeine Intake, Exercise Hours
- **Target variable:** Overstimulated



Demographics & Rest



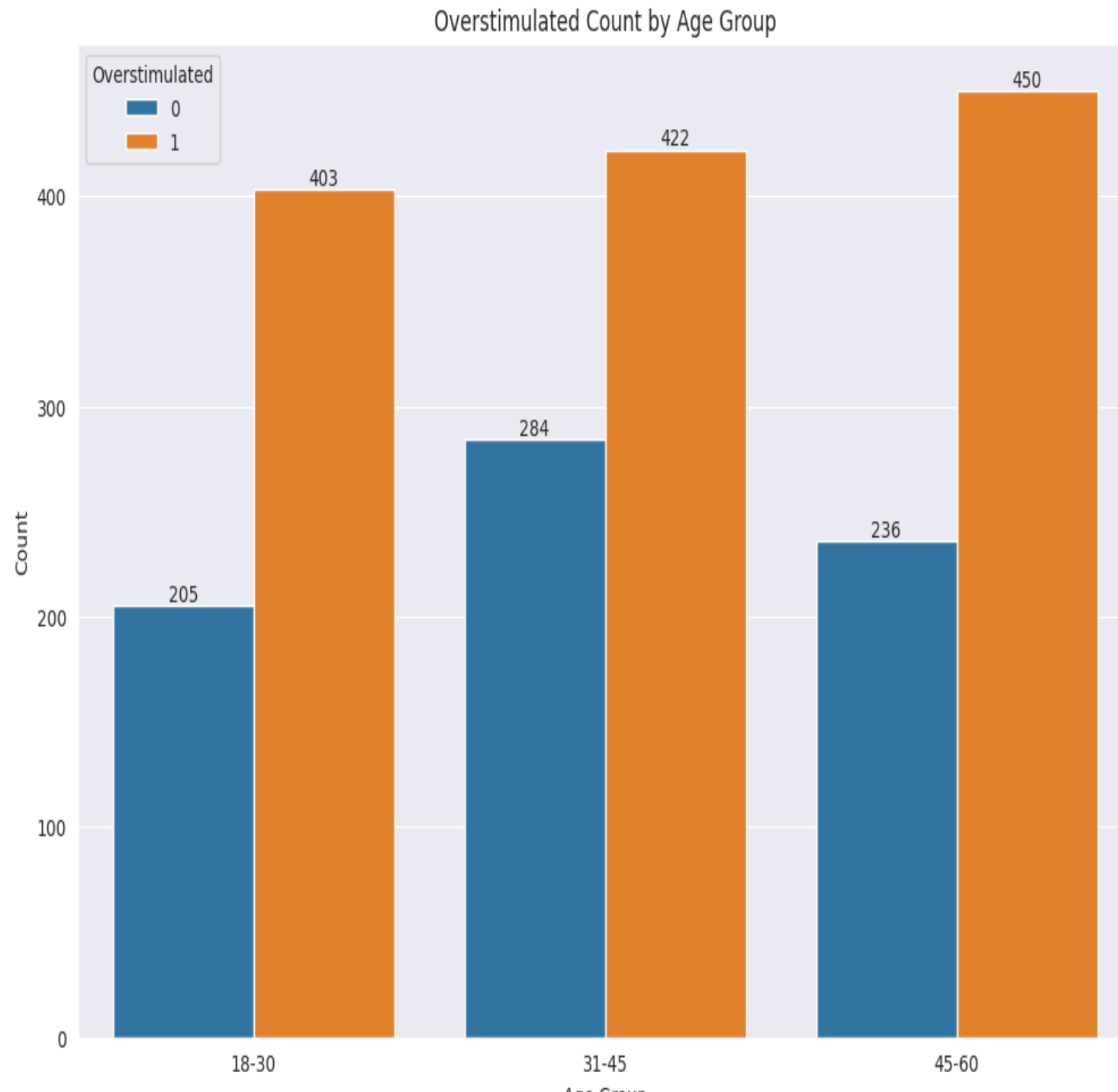
Individuals who are overstimulated tend to sleep less than those who are not. The minimum sleep time for overstimulated individuals was **3** hours, while for not stimulated persons was about **5** hours.

Overstimulation by Age Group

The age distribution of the data is between 18 – 59 years.

This was grouped together to discover what age group are more overstimulated?

As observed from the chart, **45 – 60** group are more overstimulated than the rest of the groups. It can be observed that the higher the age, the more the individual becomes overstimulated.



Age vs Lifestyle

```
# Checking some lifestyle features against age group
```

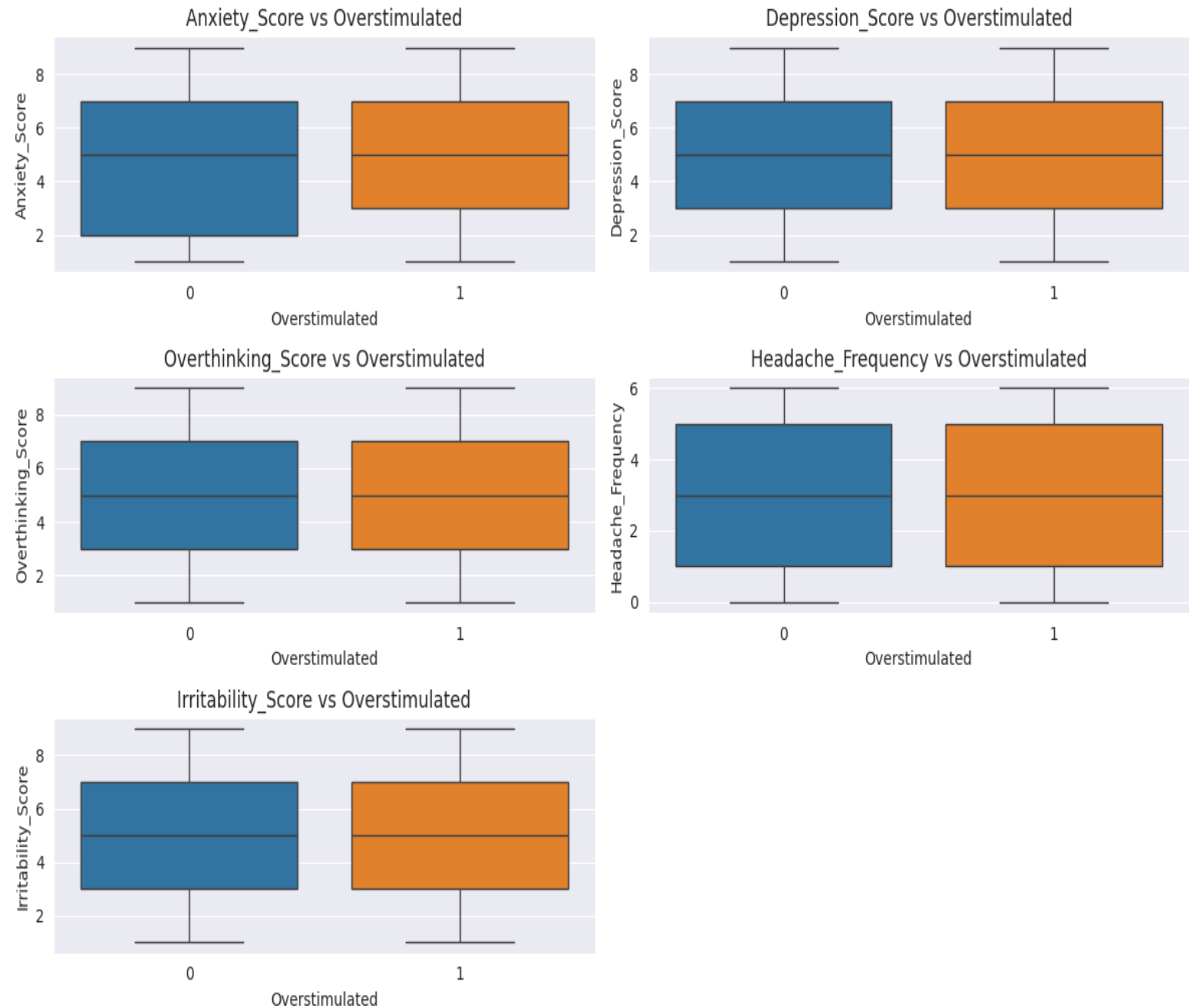
```
df.groupby('Age_Group')[['Sleep_Hours', 'Screen_Time', 'Work_Hours', 'Anxiety_Score',  
                        'Depression_Score', 'Overthinking_Score', 'Irritability_Score']].mean().reset_index().round(3)
```

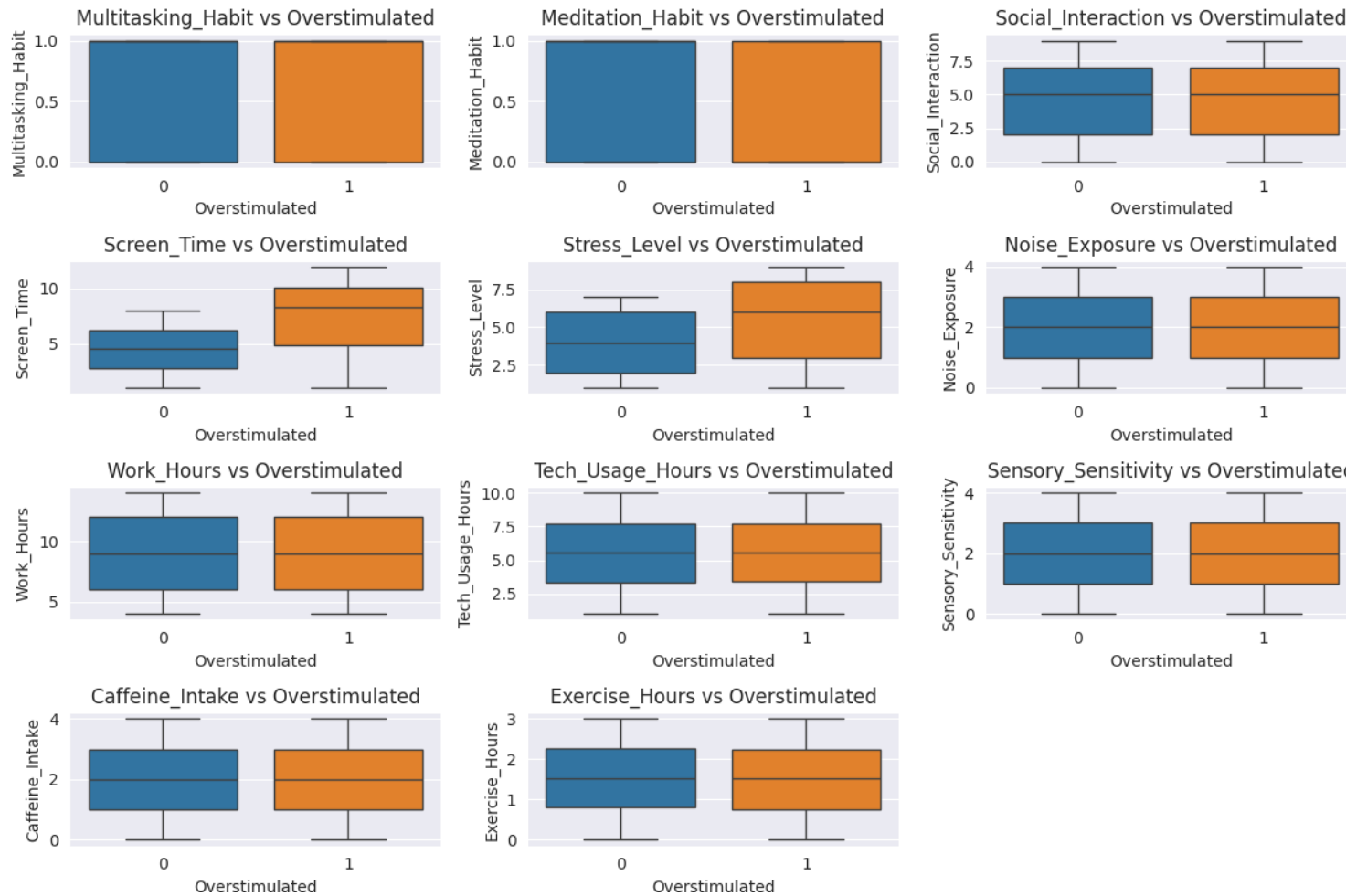
	Age_Group	Sleep_Hours	Screen_Time	Work_Hours	Anxiety_Score	Depression_Score	Overthinking_Score	Irritability_Score
0	18-30	6.361	6.515	8.896	5.104	4.985	5.049	5.266
1	31-45	6.585	6.294	8.868	4.771	4.909	5.051	5.025
2	45-60	6.539	6.419	8.994	4.879	4.921	5.003	5.034

- Individuals between **18-30** have longer mean Screen Time hours, higher Anxiety, Depression and Irritability Scores than the rest. However, the **45-60** group have higher work hours , while **31-45** have higher Overthinking score.

Mental Health vs Overstimulated

No notable difference was observed in the mental health category between overstimulated and not stimulated individuals.





In habits and exposure, overstimulated individuals have longer screen time hours, as well as higher stress levels compared to non stimulated group

Habits and Exposure vs Overstimulated

Selection of Appropriate ML Models

Importance of Model Selection

Choosing the right machine learning model is essential for obtaining accurate insights from data analysis.

Random Forest Classifier

This was used because it captures complex, non-linear relationships. It handles mixed data types and is useful for feature selection and understanding underlying drivers.

XGBoost Classifier

Handles class imbalance and is useful for smaller datasets.



Classification Report

1. Both models have a precision score of 100%, however, for Random Forest Classification, the recall accuracy is 99%. The model caught 99% of overstimulated cases.

2. F1 scores are 100% which means the models are effective at predicting Overstimulation score.

```
Random Forest Classification Report:
              precision    recall  f1-score   support

     0           1.00       0.99       1.00       145
     1           1.00       1.00       1.00       255

 accuracy          1.00
 macro avg          1.00
weighted avg          1.00

Confusion Matrix:
[[144   1]
 [  0 255]]
Accuracy: 0.9975
```

```
XGBoost Classification Report:
              precision    recall  f1-score   support

     0           1.00       1.00       1.00       145
     1           1.00       1.00       1.00       255

 accuracy          1.00
 macro avg          1.00
weighted avg          1.00

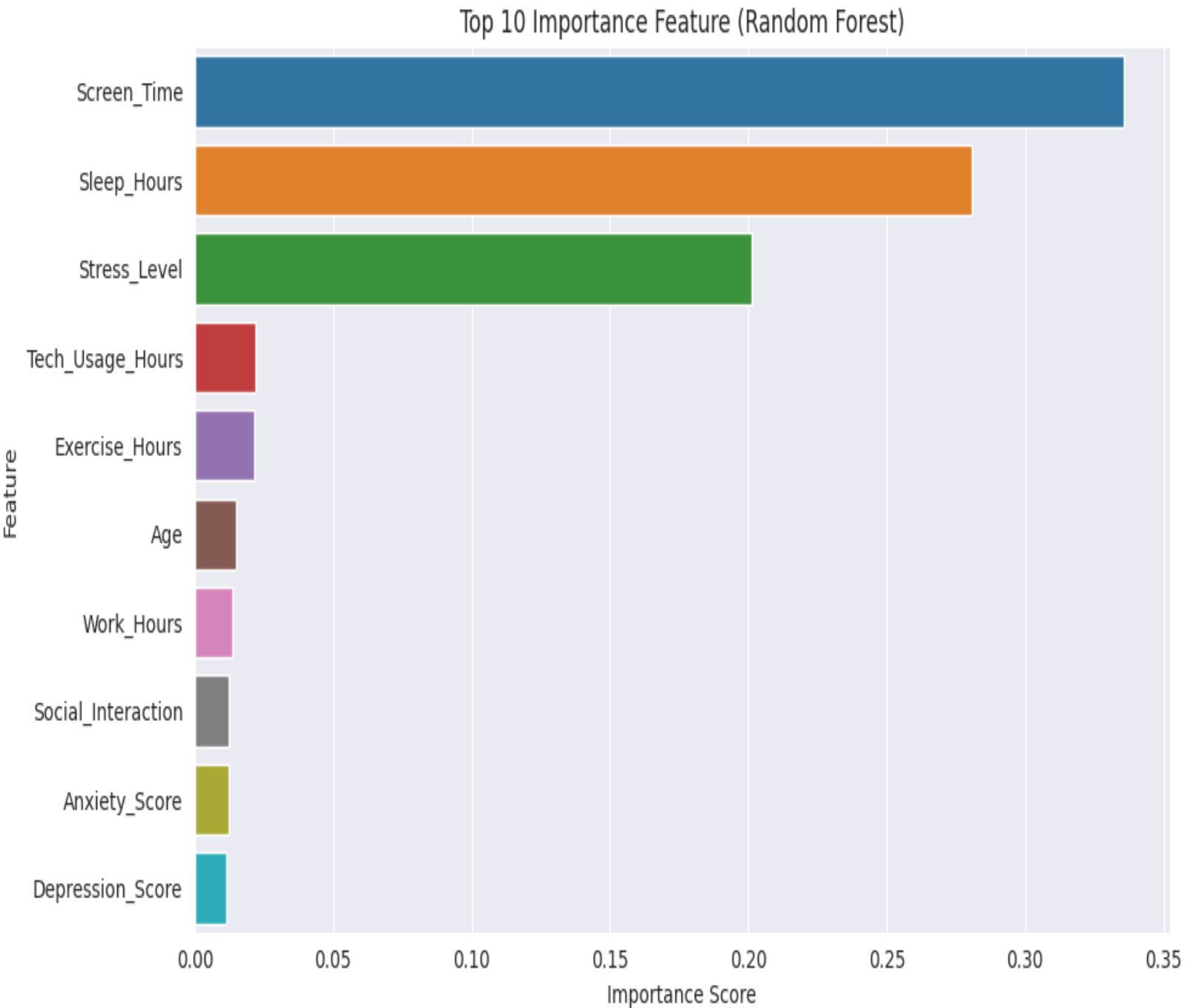
Confusion Matrix:
[[145   0]
 [  0 255]]
Accuracy: 1.0
```

What are the Important Features ?

What are the features affecting the models?

With the Random Forest Algorithm, Screen time, sleep hours and stress levels are the top three features causing Overstimulation

Features	Importance
Screen_Time	0.335518
Sleep_Hours	0.280887
Stress_Level	0.201371
Tech_Usage_Hours	0.022123
Exercise_Hours	0.021699
Age	0.014987
Work_Hours	0.013725
Social_Interaction	0.012267
Anxiety_Score	0.012148
Depression_Score	0.011491

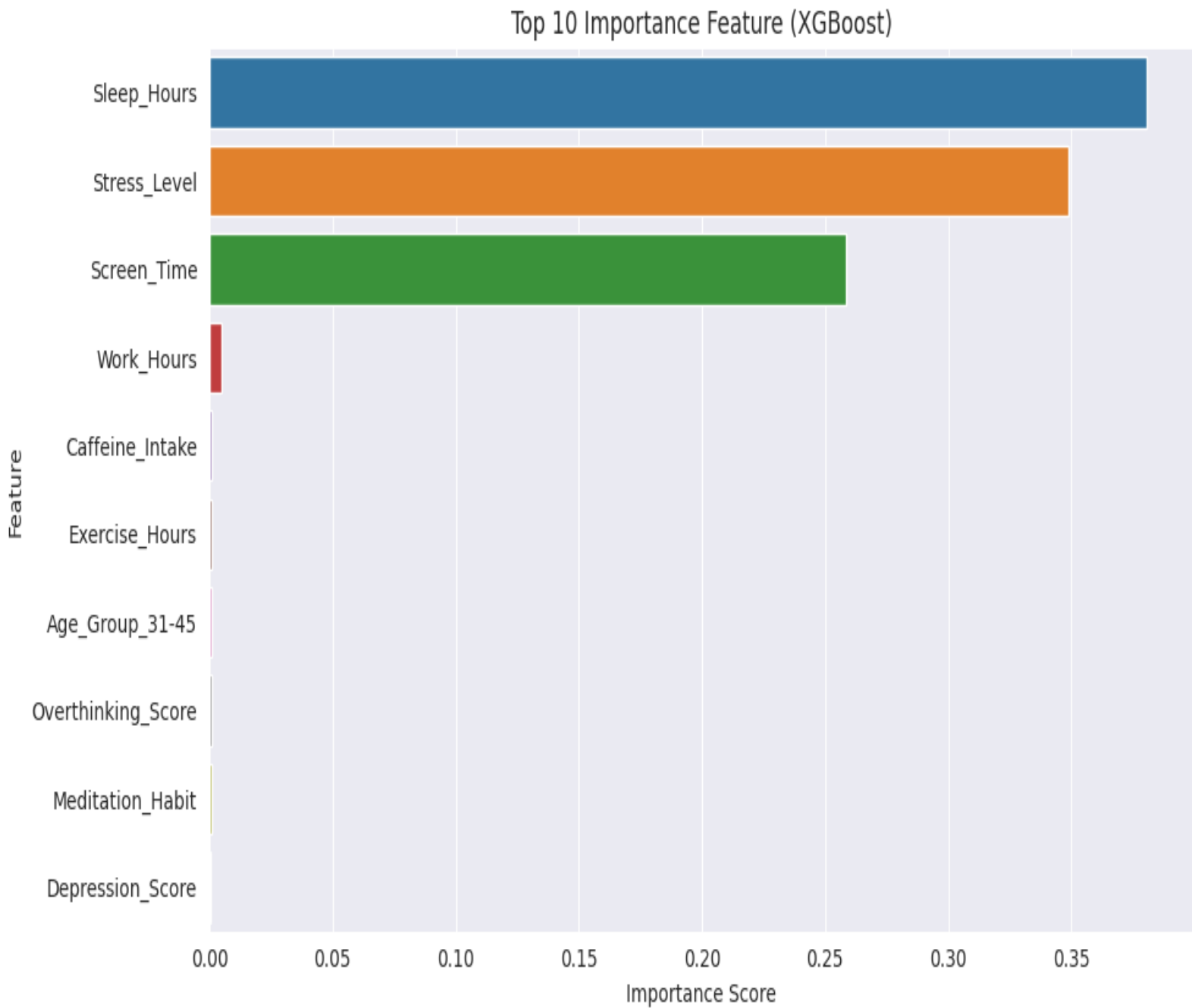


What are the Important Features ?

What are the features affecting the models?

While with the **XGBoost Algorithm**, Sleep Hours, Stress Level and Screen Time are the top three features causing Overstimulation

Features	Importance
Sleep_Hours	0.380400
Stress_Level	0.348868
Screen_Time	0.258485
Work_Hours	0.005134
Caffeine_Intake	0.001052
Exercise_Hours	0.001044
Age_Group_31-45	0.000987
Overthinking_Score	0.000968
Meditation_Habit	0.000798
Depression_Score	0.000659



Summary of Key Findings

- The analyses show that older people (45 – 60) were more overstimulated than the younger age groups (18 -30, 31 – 45). However, this findings does not tally with previous studies which says that Sensory Issues tend to improve as a child grows older, and many children experience reduced sensitivities as they transition into adulthood ([Rehabmart, n.d](#))
- Individuals who are overstimulated have lesser sleep hours than those who are not overstimulated.
- Overstimulated individuals have longer screen time hours as well as higher stress levels compared to non stimulated group.
- Based on the models created, they recognized Screen Time, Sleep Hours and Stress Levels as factors that can cause overstimulation.





Lifestyle Changes to Reduce Overstimulation

Reduce Screen Time

Cutting down on screen time can significantly lower feelings of overstimulation and improve mental well-being.

Prioritize Sleep

Getting adequate sleep is crucial for mental health and can help combat the effects of overstimulation.

Mindfulness Practices

Incorporating mindfulness practices such as meditation can help calm the mind and reduce overstimulation.

Conclusion

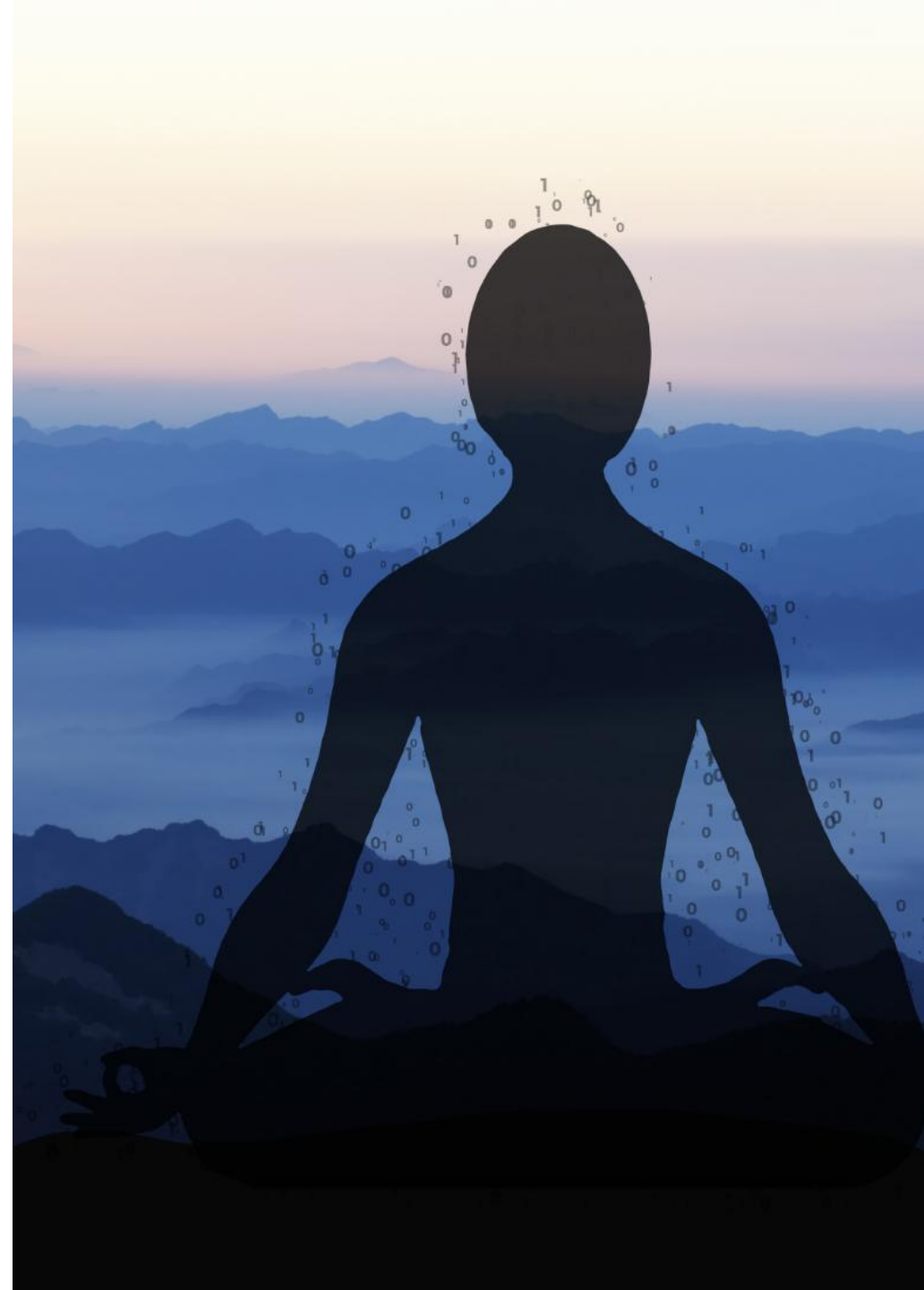
Need for Awareness

Raising awareness about these correlations is essential for individuals to make informed choices regarding their health.

Proactive Changes

Implementing proactive changes in daily routines can help mitigate the effects of overstimulation and improve overall health.

Link to presentation: https://www.linkedin.com/posts/onyinyechukwu-obijiofor-7b2276144_healthdataanalysis-healthdata-publichealth-activity-7317399726272741376-1QgP?utm_source=share&utm_medium=member_desktop&rcm=ACoAACLSO_YBiNSYMoWvDMddOeWCfKda181jIGM



Thank You!