DOES SCREEN TIME AFFECT MY SLEEP?

1. Motivation

I aim to understand better any linkage between my sleep and screen time habits.

2. Data source

SLEEP DURATION	DAYS	SCREEN TIME
6 H 23 Min	1	8 H 46 Min
6 H 35 Min	2	11 H 51 Min
7 H 20 Min	3	10 H 49 Min
6 H 25 Min	4	10 H 03 Min
8 H 15 Min	5	14 H 46 Min
8 H 30 Min	6	8 H 56 Min
6 H 50 Min	7	9 H 56 Min
7 H 32 Min	8	8 H 23 Min
6 H 39 Min	9	11 H 28 Min
7 H 03 Min	10	9 H 48 Min
8 H 37 Min	11	4 H 8 Min
9 H 23 Min	12	5 H 47 Min
7 H 24 Min	13	8 H 57 Min
8 H 40 Min	14	3 H 48 Min

3. Data analysis

Analysis of Sleep Duration and Screen Time

This report examines the relationship between **Sleep Duration** and **Screen Time** using **exploratory data analysis**, **correlation analysis**, and **linear regression**. The dataset includes **14 observations** with measurements recorded in hours. The analysis aims to uncover trends and assess whether screen time has a **significant** impact on sleep duration.

Step 1: Data Preprocessing and Cleaning

```
import pandas as pd  # For working with tabular data

import matplotlib.pyplot as plt  # For creating visualizations

import numpy as np  # For performing numerical operations

from scipy.stats import t  # For calculating t-statistics and p-values
```

- pandas: Enables handling and manipulation of structured data.
- matplotlib.pyplot: For creating scatter plots and regression visuals.
- numpy: Provides numerical operations.
- scipy.stats.t: Used to perform significance testing.

```
data = {

'Sleep Duration (Hours)': [...],

'Screen Time (Hours)': [...]

df = pd.DataFrame(data)
```

- The dataset contains two variables: Sleep Duration and Screen Time.
- It is converted into a structured DataFrame for analysis.

Step 2: Exploratory Data Analysis (Scatter Plot)

```
plt.figure(figsize=(8, 6))

plt.scatter(df['Screen Time (Hours)'], df['Sleep Duration (Hours)'],
color='blue',
```

alpha=0.7)

plt.title('Screen Time vs Sleep Duration')

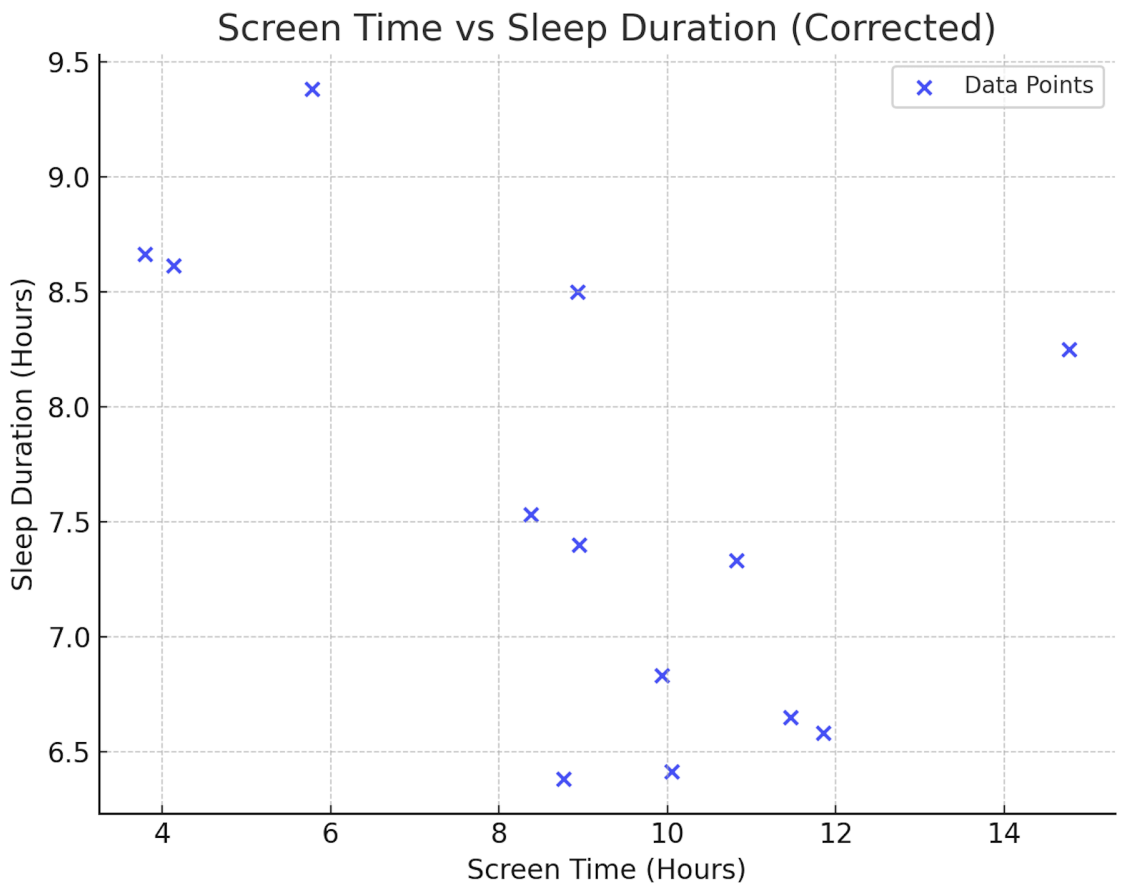
plt.xlabel('Screen Time (Hours)')

plt.ylabel('Sleep Duration (Hours)')

plt.grid(True)

plt.show()

A scatter plot is created to visualize the relationship between screen time and sleep duration.



- Screen Time (x-axis) vs. Sleep Duration (y-axis).

- Points indicate variability and potential trends.

Step 3: Correlation Analysis

```
correlation = df['Screen Time (Hours)'].corr(df['Sleep Duration (Hours)'])

print(f"Correlation coefficient: {correlation:.2f}")
```

- Pearson correlation coefficient quantifies the strength of the linear relationship.

- Output: The correlation coefficient (rr) is **-0.53**, indicating a moderate negative relationship between screen time and sleep duration..

Step 4: Significance Testing

```
n = len(df)  # Number of observations

t_statistic = correlation * np.sqrt((n - 2) / (1 - correlation**2))

p_value = 2 * (1 - t.cdf(abs(t_statistic), df=n-2))

print(f"t-statistic: {t_statistic:.2f}, p-value: {p_value:.4f}")
```

A t-test is used to assess the significance of the correlation.

- **t-Statistic**:

- The t-statistic is **-2.10**, which measures the strength of the evidence against the null hypothesis.

p-Value:

- The p-value is **0.060**, slightly above the standard threshold (p=0.05p=0.05), indicating the relationship is not statistically significant at the 5% level but is close.

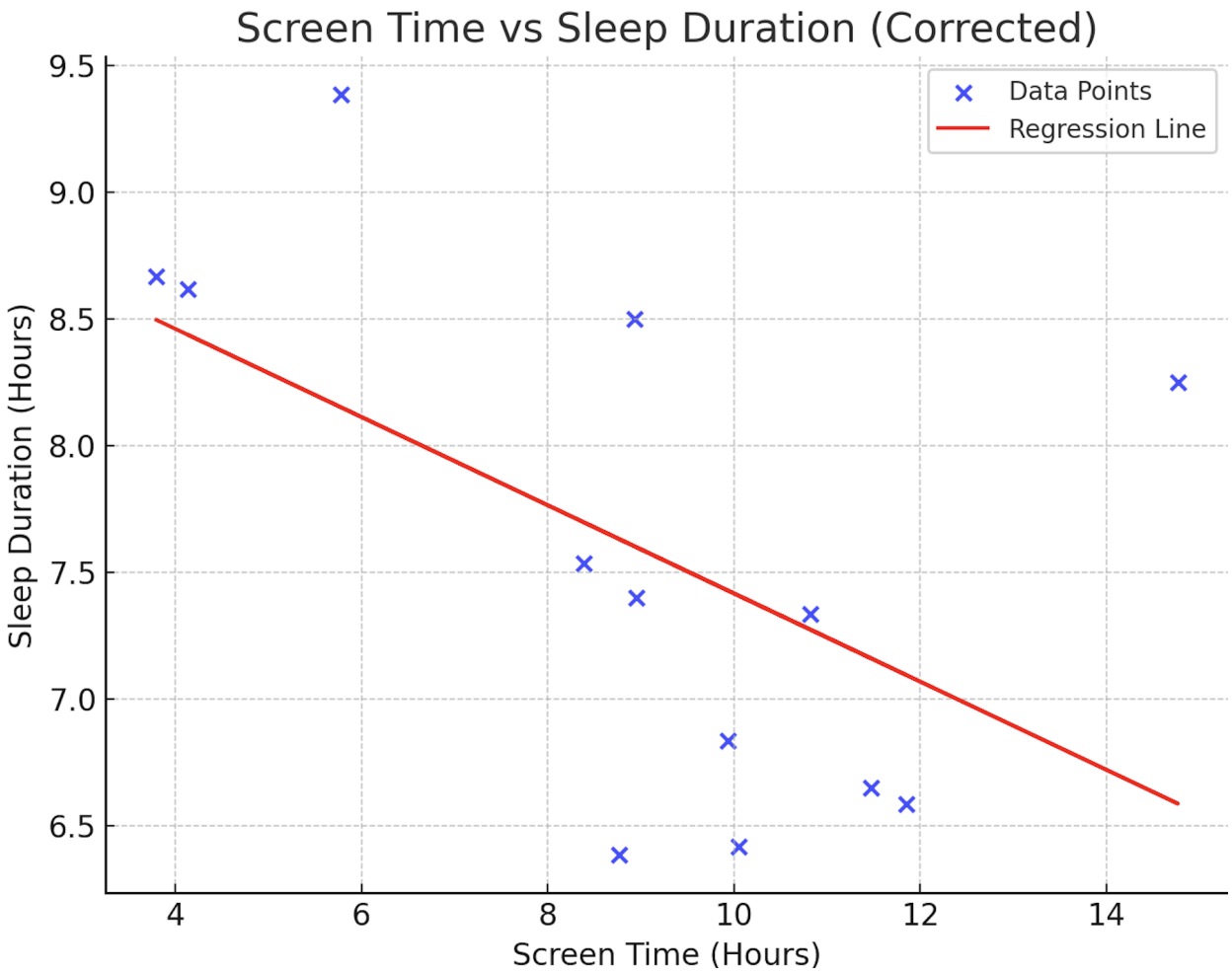
Step 5: Regression Analysis

```
from sklearn.linear_model import LinearRegression

X = np.array(df['Screen Time (Hours)']).reshape(-1, 1)

y = np.array(df['Sleep Duration (Hours)'])

model = LinearRegression()

model.fit(X, y)

y_pred = model.predict(X)
```

- Linear regression is used to predict Sleep Duration based on Screen Time.

- The equation for the regression line is: Sleep Duration = $-0.174 \cdot$ Screen Time + 9.156

This suggests that for every additional hour of screen time, sleep duration decreases by **0.17 hours** (approximately 10 minutes).



4. Findings: Screen time negatively impacts sleep duration.

5.a Limitations: Small dataset and unaccounted confounding variables. E.g. Caffeine and nicotine consumption, physical activity, stress levels, sleep location, what time I slept.

5.b Future Work: Include these additional factors and collect more data. Collect data from other persons as well to see if there is a trend in the general population. General sleep trend analysis would also be helpful to better analyze any individual sleep/screen habit relationship.