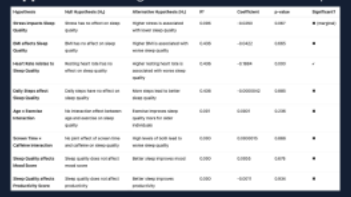
Appendix: OLS Regression values summed up



THANKS for your attention!

Questions?

Sleep Quality Analysis

Investigation on the effects on and of sleep quality

Data Overview

Sources
- Sleep Health and Lifestyle Dataset
- Sleep Cycle and Productivity Dataset

Key variables
- Lifestyle: Stress Level, Exercise, Screen Time, Caffeine Intake
- Physiological: Age, BMI, Heart Rate, Daily Steps
- Outcome: Sleep Quality, Mood and Productivity Score

Methodolgy Overview

Data Cleaning
- Removed missing and implausible values
- Handled outliers
- Encoded categorical variables

Exploratory Data Analysis
- distribution histograms
- correlation matrices
- pairplots

Modeling
- Applied Ordinary Least Squares (OLS) regression
- included interaction terms for combined variable effects

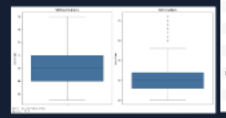
Evaluation
- interpreted R^2, p-values, and coefficients
- visualized model fits using seaborn regplot

Hypotheses

Challenges

Missing values
- Merging of multiple data sources led to missing values in several variables
- Especially affected: Heart Rate, Daily Steps, BMI
- High proportion of missing data would bias results

Outliers
- Cleaned dataset by removing rows with missing values
- Result: Reduced sample size → 374 complete cases used in regression models



On the first view, only one clear linear relation ...

Conclusion

- **Statistically significant effects?**
  - effect of heart rate on sleep quality was found **statistical significant**
  - BMI, Daily Steps, and Stress Level showed **no significant** impact on sleep quality
  - interaction effects (Exercise × Age, Caffeine × Screen Time) were **not statistically significant**
  - **No evidence** found for an effect of sleep quality on mood or productivity scores

- **Sample size limitations**
  - The reduced sample size for key variables (n = 374) may have limited statistical power to detect significant relationships, especially for subtle effects

- Potential multicollinearity
  - Some independent variables may be correlated (e.g., Heart Rate and BMI, Stress Level and Heart Rate, Age and Exercise etc) which could affect the stability and interpretation of regression coefficients

- **Model Fit (R^2 values)**
  - R-squared values were consistently low (mostly < 0.01), indicating that the models explained very little variance in sleep quality, mood, or productivity
  - Implication: Other unobserved variables likely play a larger role in determining sleep quality and its outcomes

Sleep Quality Analysis

Investigation on the effects on and
of sleep quality

AGENDA

Data Overview	Step 1
Methodology Overview	Step 2
Hypotheses	Step 3
Conclusion	Step 4

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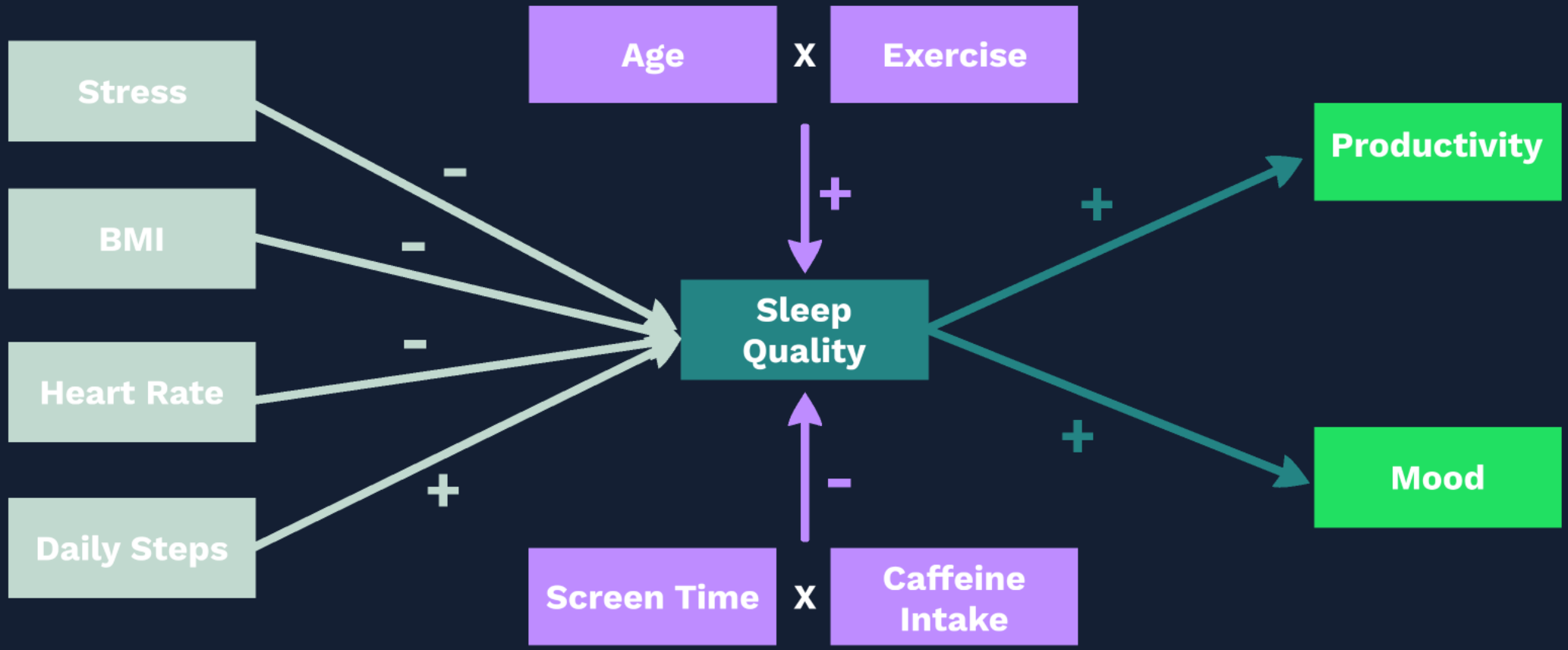
Stress
BMI
Heart Rate
Daily Steps
Age
X
Exercise
Sleep Quality
Screen Time
X
Caffeine Intake
Productivity
Mood
-
-
-
+
+
+
+
-

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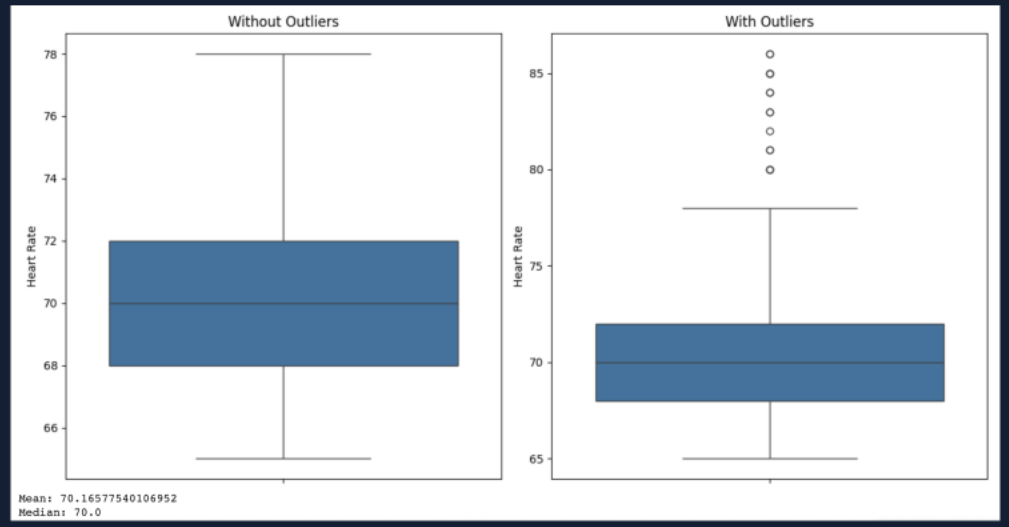
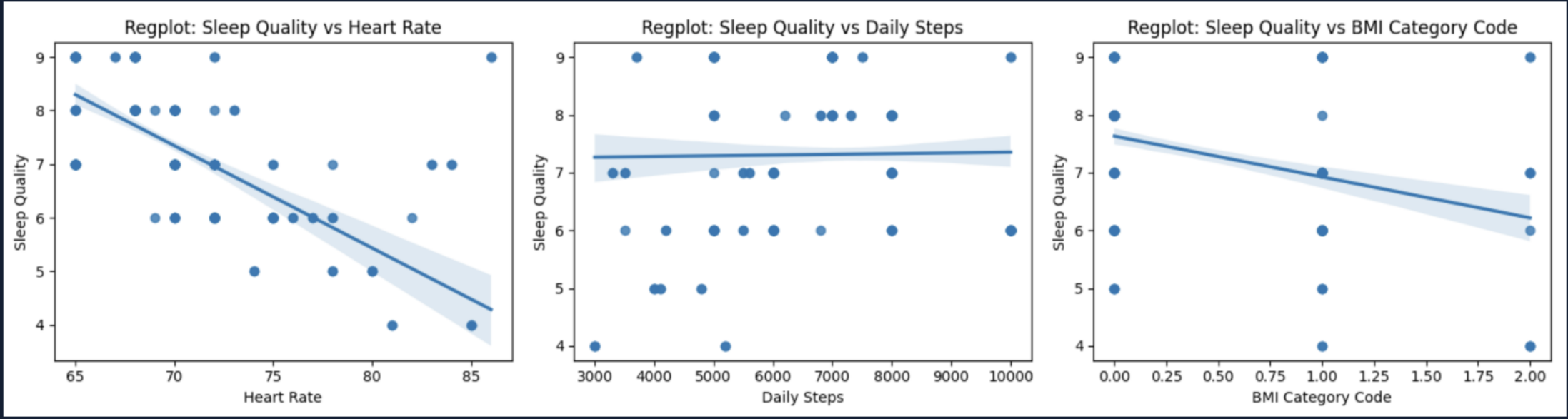


	0
Gender	0
Age	0
Total Sleep Hours	0
Sleep Quality	0
Exercise (mins/day)	0
Stress Level	0
BMI Category	5000
Heart Rate	5000
Daily Steps	5000
Age Category	0
BMI Category Code	5000
Caffeine Intake (mg)	374
Screen Time Before Bed (mins)	374
Work Hours (hrs/day)	374
Productivity Score	374
Mood Score	374

On the first view, only one clear linear relation ...



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Appendix: OLS Regression values summed up

Hypothesis	Null Hypothesis (H_0)	Alternative Hypothesis (H_1)	R^2	Coefficient	p-value	Significant?
Stress impacts Sleep Quality	Stress has no effect on sleep quality	Higher stress is associated with lower sleep quality	0.006	-0.0250	0.067	✖ (marginal)
BMI affects Sleep Quality	BMI has no effect on sleep quality	Higher BMI is associated with worse sleep quality	0.436	-0.0422	0.665	✖
Heart Rate relates to Sleep Quality	Resting heart rate has no effect on sleep quality	Higher resting heart rate is associated with worse sleep quality	0.436	-0.1884	0.000	✔
Daily Steps affect Sleep Quality	Daily steps have no effect on sleep quality	More steps lead to better sleep quality	0.436	-0.0000042	0.885	✖
Age × Exercise Interaction	No interaction effect between age and exercise on sleep quality	Exercise improves sleep quality more for older individuals	0.001	0.0001	0.236	✖
Screen Time × Caffeine Interaction	No joint effect of screen time and caffeine on sleep quality	High levels of both lead to worse sleep quality	0.000	0.0000015	0.866	✖
Sleep Quality affects Mood Score	Sleep quality does not affect mood score	Better sleep improves mood	0.000	0.0055	0.676	✖
Sleep Quality affects Productivity Score	Sleep quality does not affect productivity	Better sleep improves productivity	0.000	-0.0011	0.934	✖