GITHUB PORTFOLIO

TIME SERIES MONITORING DATA

E REPORT

NAME OF PROJECT:
GITHUB PORTFOLIO

PRESENTED BY:
Morales, Enrico James E. &
Pinzon Jazreel S.

MAPUA UNIVERSITY
BI120L_CON29

Introduction

This analysis focuses on tracking and evaluating the monthly health metrics of three patients over a 42-month period. The dataset includes average daily step counts, self-reported stress levels, and BMI values. By applying time-series visualization and statistical methods, the study aims to uncover trends in physical activity and stress, assess BMI stability, and examine whether changes in behavior (e.g., steps taken) are linked to psychological or physiological outcomes particularly in Patient 1. This provides insight into the role of consistent movement and activity in managing stress over time.

METHODS USED FOR ANALYSIS

The dataset containing 42 monthly records was loaded in R. Variables of interest included step counts (avg_steps), stress levels, and BMI values for three individual patients.

Descriptive Statistics:

The describe() function from the psych package was used to compute measures such as mean, standard deviation, median, and range for each health metric.

Line Graphs (Time-Series Visualization):

used to track changes in:

- Average Steps per patient across months
- Stress Levels per patient across months
- Implemented using ggplot2 to observe patterns and individual variability.
- Boxplot Analysis:
- Created to compare the distribution and variability of BMI across patients using grouped boxplots.

Correlation Test:

- A Pearson correlation test (cor.test()) was applied between Patient 1's average steps and stress level to test for linear association.
- Linear Regression Analysis:
- A simple linear model (lm()) was fitted to quantify the predictive relationship between step count and stress level for Patient 1.

KEY RESULTS AND PLOTS

Line Plot – Average Steps per Patient

- Each patient exhibited a distinct monthly pattern of physical activity.
- Patient 3 had the highest variability and peak step counts (up to ~9894 steps), while Patient 1 had generally lower and more fluctuating step counts.

Line Plot – Stress Levels per Patient

- Stress levels varied monthly, with Patient 1 and Patient 2 consistently reporting moderate to high levels.
- Patient 3 showed the widest fluctuation, occasionally dipping as low as 1.

Boxplots – BMI Distribution

- Patient 1 and 3 had a wider BMI range (23–26), indicating more body weight variation.
- Patient 2 had the most consistent BMI (narrow range: 24.0–24.9).

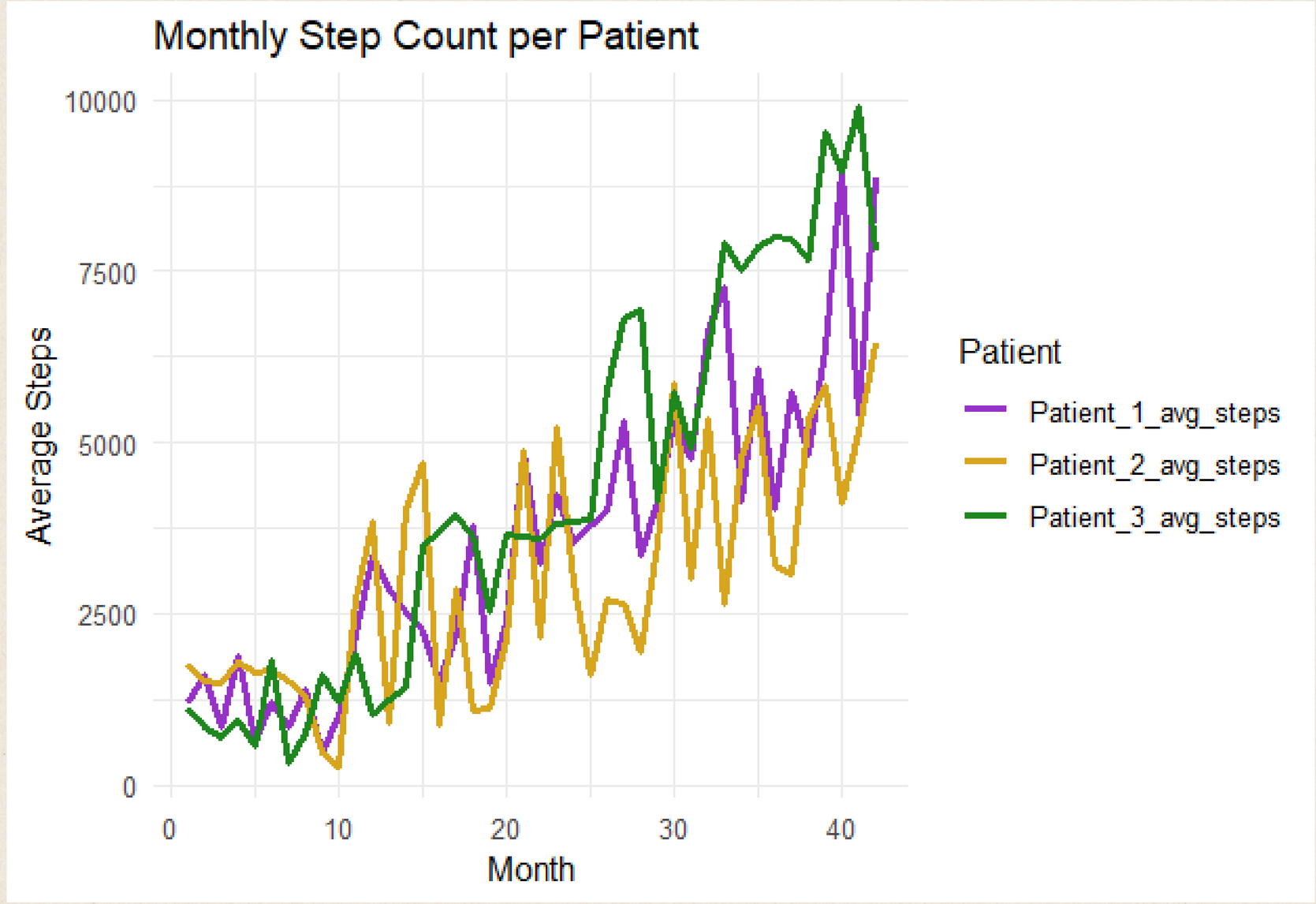
Correlation Test (Patient 1 Steps vs Stress)

- Strong negative correlation: $r = -0.936$, $p < 0.001$
- As step count increased, stress level decreased significantly.

Linear Regression (Patient 1)

- Regression model: $\text{Stress\_Level} = 10.08 - 0.000991 \times \text{avg\_steps}$
- Highly significant model ($R^2 = 0.875$) suggests that step count explains 87.5% of the variation in stress levels.

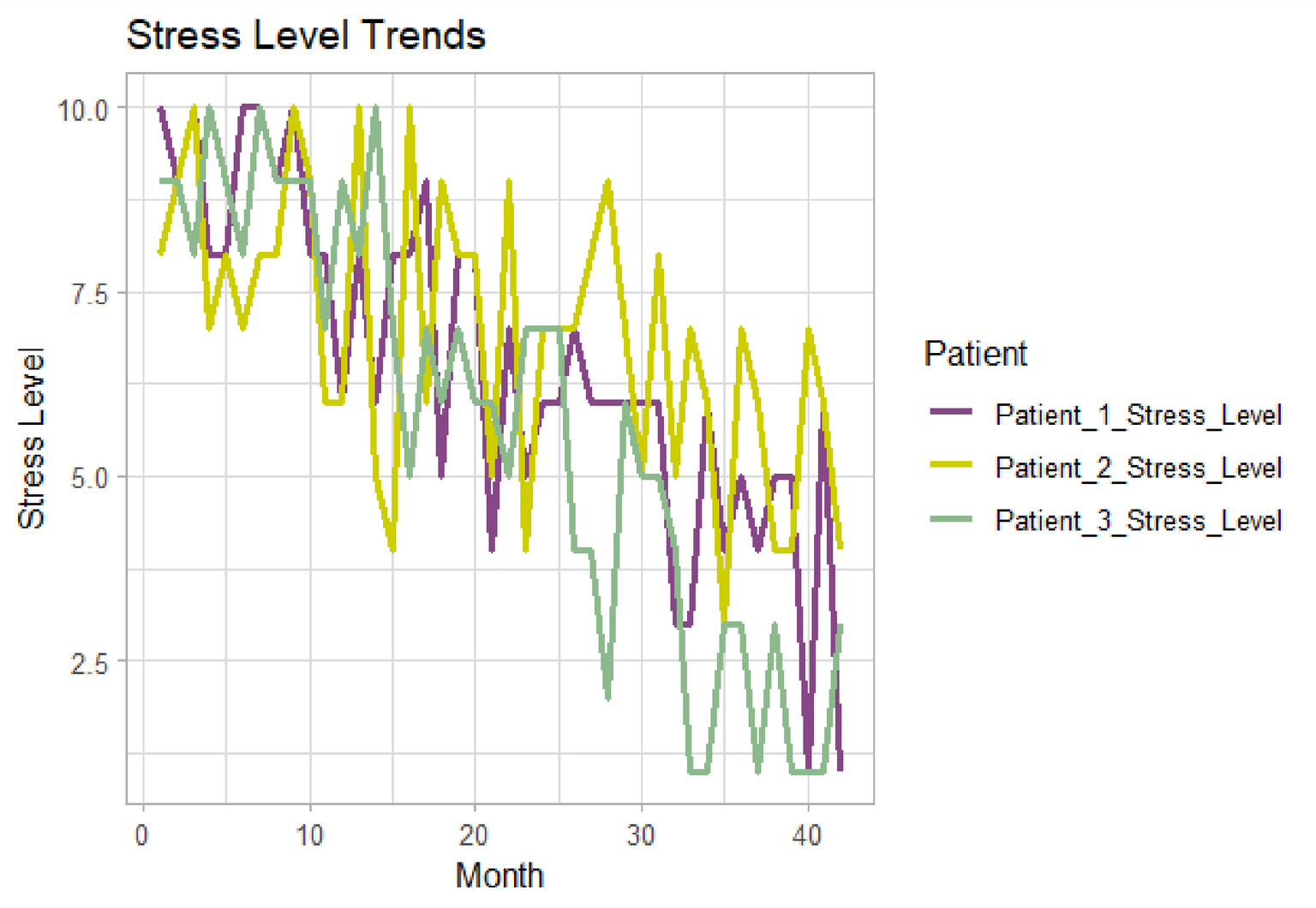
PLOTS



Line Plot (Figure 1)

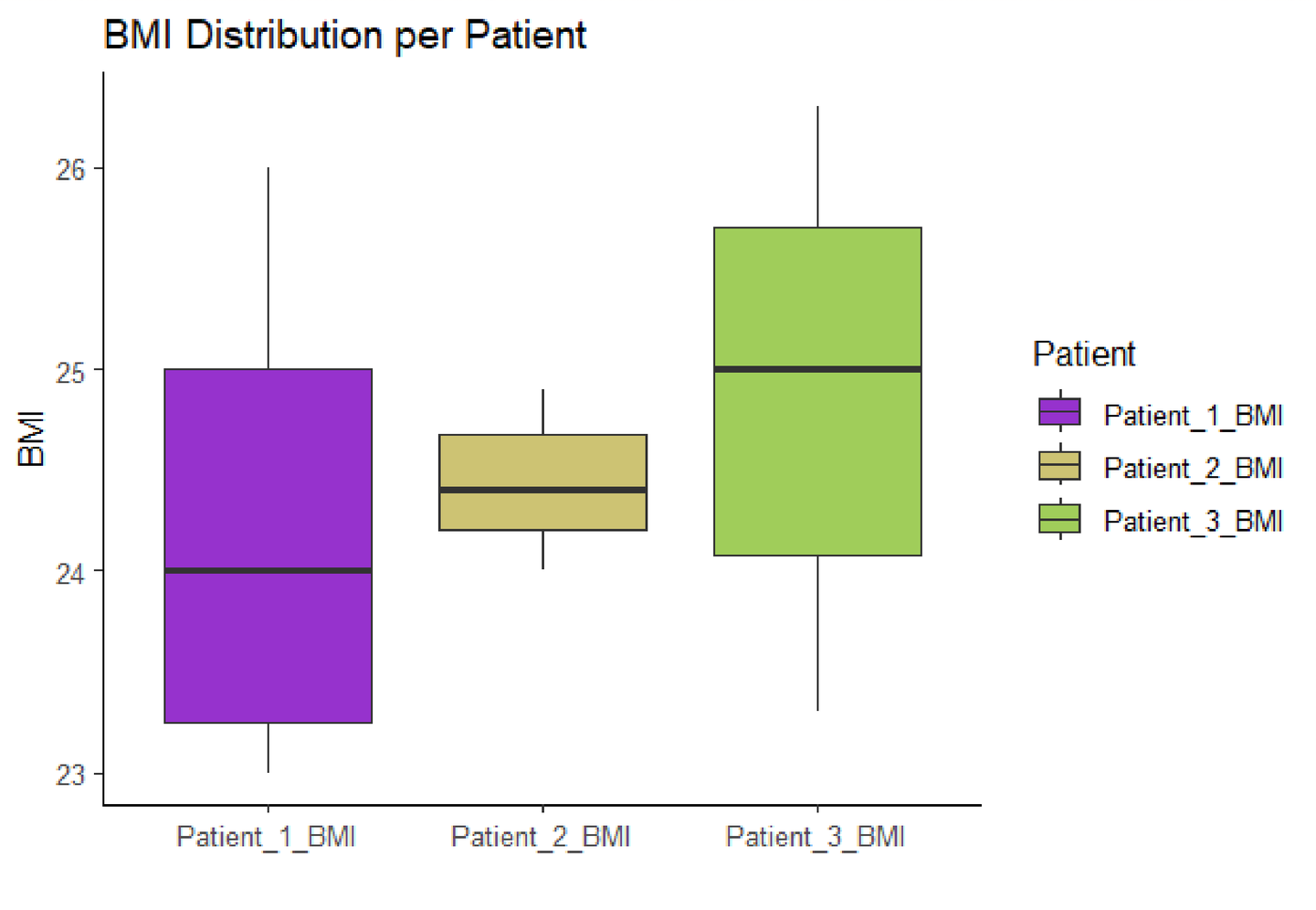
– Monthly Average Steps per Patient This plot tracks monthly average steps for each patient, highlighting distinct physical activity patterns. Patient 3 exhibited the highest variability and overall step counts, while Patient 1 showed more fluctuations and generally lower values.

PLOTS



Line Plot (Figure 2)–
Monthly Stress Levels per Patient
Stress levels over time varied by individual. Patient 3 displayed sharp fluctuations (low of 1, high of 10), while Patient 1 and 2 showed more moderate, yet consistent stress levels.

PLOTS



Boxplot (Figure 3) – BMI

Distribution per Patient

The boxplots reveal differences in BMI consistency. Patient 2 had the most stable BMI values (~24.4), while Patients 1 and 3 had broader ranges, indicating more variation in body mass index over time.

TEST

Correlation Plot – Steps vs Stress (Patient 1)

Pearson correlation shows a strong inverse relationship (r = -0.936) between physical activity and stress for Patient 1 suggesting that increased movement is associated with lower stress.

The regression model confirms that higher step counts significantly predict lower stress levels. The model explains 87.5% of stress variation (R^2 = 0.875), indicating strong predictive value.

INTERPRETATION AND CONCLUSION

PHYSICAL ACTIVITY TRENDS DIFFERED SIGNIFICANTLY ACROSS PATIENTS:

- PATIENT 3 CONSISTENTLY HAD THE HIGHEST STEP COUNTS.
- PATIENT 1 SHOWED IRREGULAR AND OFTEN LOWER PHYSICAL ACTIVITY.
- STRESS LEVELS FLUCTUATED INDIVIDUALLY:
- PATIENT 3 EXHIBITED THE WIDEST STRESS RANGE (1–10).
- PATIENT 1 AND 2 HAD MORE CONSISTENT MID-TO-HIGH LEVELS (AROUND 6–7).
- BMI REMAINED STABLE OVERALL, ESPECIALLY FOR PATIENT 2 WHOSE VALUES STAYED NEAR 24.4.
- PATIENTS 1 AND 3 HAD SLIGHTLY MORE VARIATION IN BMI ACROSS MONTHS.
- STATISTICAL CORRELATION (PATIENT 1):
- STRONG NEGATIVE CORRELATION (R = –0.936) BETWEEN STEPS AND STRESS.
- SUGGESTS THAT INCREASED PHYSICAL ACTIVITY IS LINKED WITH LOWER STRESS.

LINEAR REGRESSION RESULTS:

- STEP COUNT IS A SIGNIFICANT PREDICTOR OF STRESS LEVEL.
- THE MODEL EXPLAINED 87.5% OF THE VARIATION IN STRESS, INDICATING HIGH RELIABILITY.

PHYSICAL ACTIVITY CAN BE A POWERFUL FACTOR IN MANAGING STRESS, AS SEEN IN PATIENT 1'S STRONG INVERSE CORRELATION. INDIVIDUAL PATTERNS MATTER EACH PATIENT RESPONDED DIFFERENTLY TO LIFESTYLE METRICS, STRESSING THE NEED FOR PERSONALIZED MONITORING. BMI STAYED RELATIVELY STABLE IN THE SHORT TERM, INDICATING THAT MAJOR WEIGHT CHANGES ARE LESS LIKELY WITHIN A FEW MONTHS. REGULAR MONITORING THROUGH TIME SERIES DATA ENABLES BETTER INSIGHTS INTO HOW DAILY HABITS AFFECT HEALTH OUTCOMES LIKE STRESS AND BMI.