

# **E-report on a Time-series Health Monitoring Dataset**

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## Introduction

This report presents a focused analysis of three patients' longitudinal health data, particularly examining their BMI, stress levels, and average daily steps over time. The objective is to summarize personal health trends, compare activity and stress patterns between individuals, and assess how physical activity relates to stress using correlation analysis. The data reflects consistent monitoring over several time points. Analysis was conducted in R.

## Methods

Descriptive statistics (mean, standard deviation, minimum, and maximum) were used to assess variability and central tendencies in each patient's health metrics. To evaluate the relationship between physical activity and stress, Pearson correlation tests were performed individually for each patient, focusing on the connection between average daily step count and stress levels.

## Key Results and Figures

### Descriptive Findings per Patient

Patient	Metric	Mean	SD	Insight
1	BMI	24.4	1.13	Healthy weight; mild fluctuations
	Stress Level	6.38	2.16	Moderately stressed; relatively stable
	Avg. Steps	3514	2075	Moderately active; some variability
2	BMI	24.4	0.32	Very stable weight with minimal fluctuation
	Stress Level	6.81	1.80	Highest average stress among all

	<b>Avg. Steps</b>	3062	1605	Least physically active overall
<b>3</b>	<b>BMI</b>	24.9	1.07	Slightly higher BMI; widest weight fluctuation
	<b>Stress Level</b>	5.88	3.22	Lowest average stress but most variable
	<b>Avg. Steps</b>	4172	2947	Most active and most variable in daily steps

### Advanced Statistical Analysis: Pearson Correlation

<b>Patient</b>	<b>Pearson Correlation</b>	<b>Interpretation</b>
1	-0.937	Strong inverse relationship: higher step count is closely tied to lower stress
2	-0.910	Strong negative correlation: even moderate increases in steps help reduce stress
3	-0.967	Strongest relationship: stress highly responsive to changes in physical activity

## Monthly BMI Trends of Patients

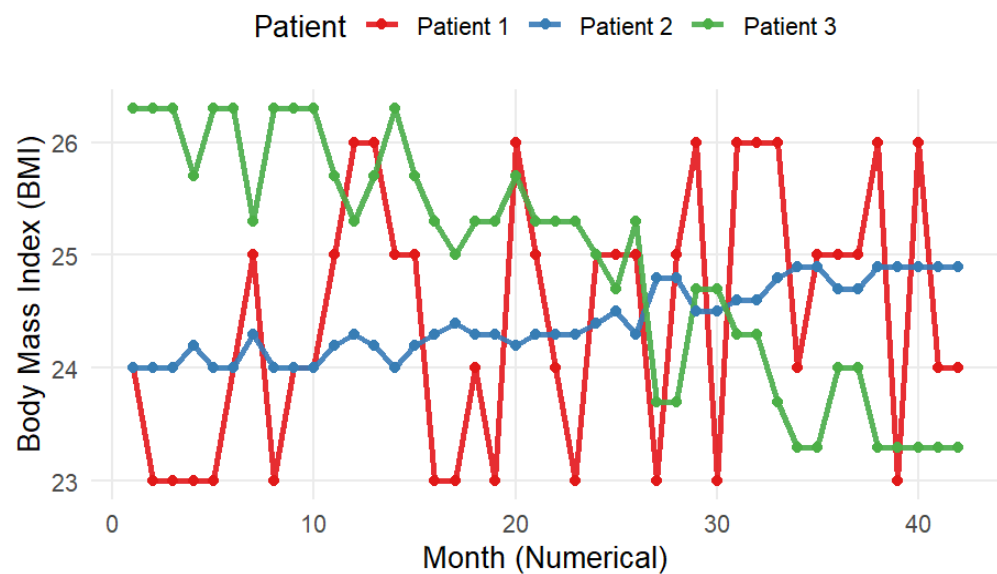


Figure 1. Monthly BMI of each patient overtime

## Monthly Stress Level Trends of Patients

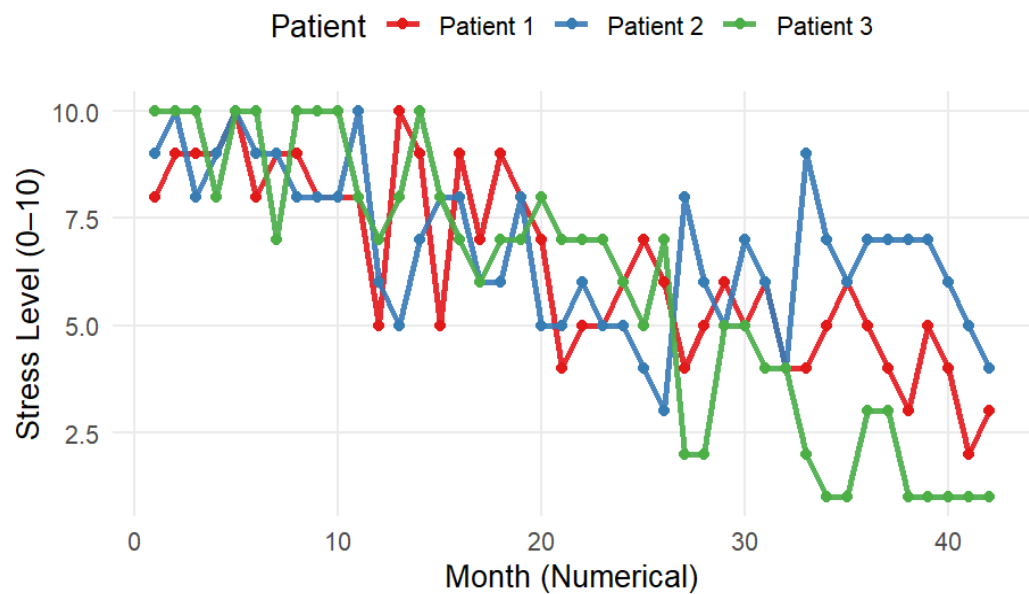
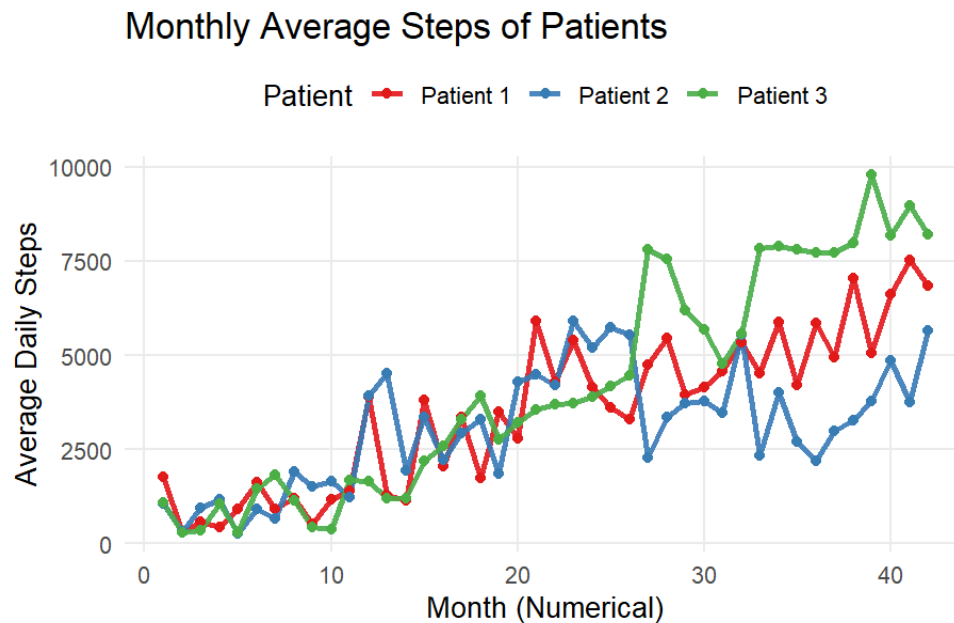


Figure 2. Monthly stress level of each patient overtime



**Figure 3.** Monthly average steps of each patient overtime

These results (reflected when comparing Figure 2 and Figure 3) suggest a consistent and strong inverse relationship between physical activity (measured by step count) and stress levels across all three patients.

## Interpretation and Conclusion

All three patients fall within a healthy BMI range, though their physical activity and stress levels vary. Patient 3 is the most active and experiences the lowest average stress, despite the highest variability in both metrics. In contrast, Patient 2 is the least active and reports the highest stress on average.

Crucially, the negative correlation between physical activity and stress is strong in all cases, highlighting the potential of regular movement—particularly walking—to significantly reduce stress. These findings support personalized health interventions that promote daily physical activity as a means of managing psychological well-being.

For long-term care or behavioral coaching, individualized recommendations based on these patterns could further improve health outcomes.