Time Series Monitoring Data

E-REPORT

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TIME SERIES

E REPORT

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INTRODUCTION

Time series health data provide a dynamic view of behavioral and physiological changes, allowing patterns to be observed over extended durations. Physical activity and stress are closely tied to overall health outcomes, with long-term implications for weight control, energy balance, and disease prevention. This analysis focuses on exploring monthly step count, stress levels, and BMI in three patients over 42 months, highlighting how these health indicators evolve and interrelate.

METHODS USED FOR ANALYSIS

The dataset was processed and analyzed entirely in R due to its capabilities in data wrangling, statistical computation, and visualization.
The data file was read using read.csv() and stored in a structured dataframe.
The dataset included monthly records of average step count, stress level, and BMI for three individual patients across 42 months.
The dataset was clean and complete, so no imputation or transformation was necessary.
The str() and summary() functions confirmed the correct data types and structure.
Descriptive statistics (mean, SD, skewness, kurtosis) were computed using the psych::describe() function.
Time series line graphs and boxplots were generated to illustrate trends in physical activity, stress, and BMI per patient.

KEY RESULTS AND FIGURES

Key Insights:
Inverse Relationship: Increased step count corresponds to decreased stress in all three patients.
Patient 3: Most dynamic improvements in both activity and stress, though BMI remains variable.
Patient 2: Best weight stability, with moderate behavioral improvements.
Patient 1: Balanced improvements in all areas.
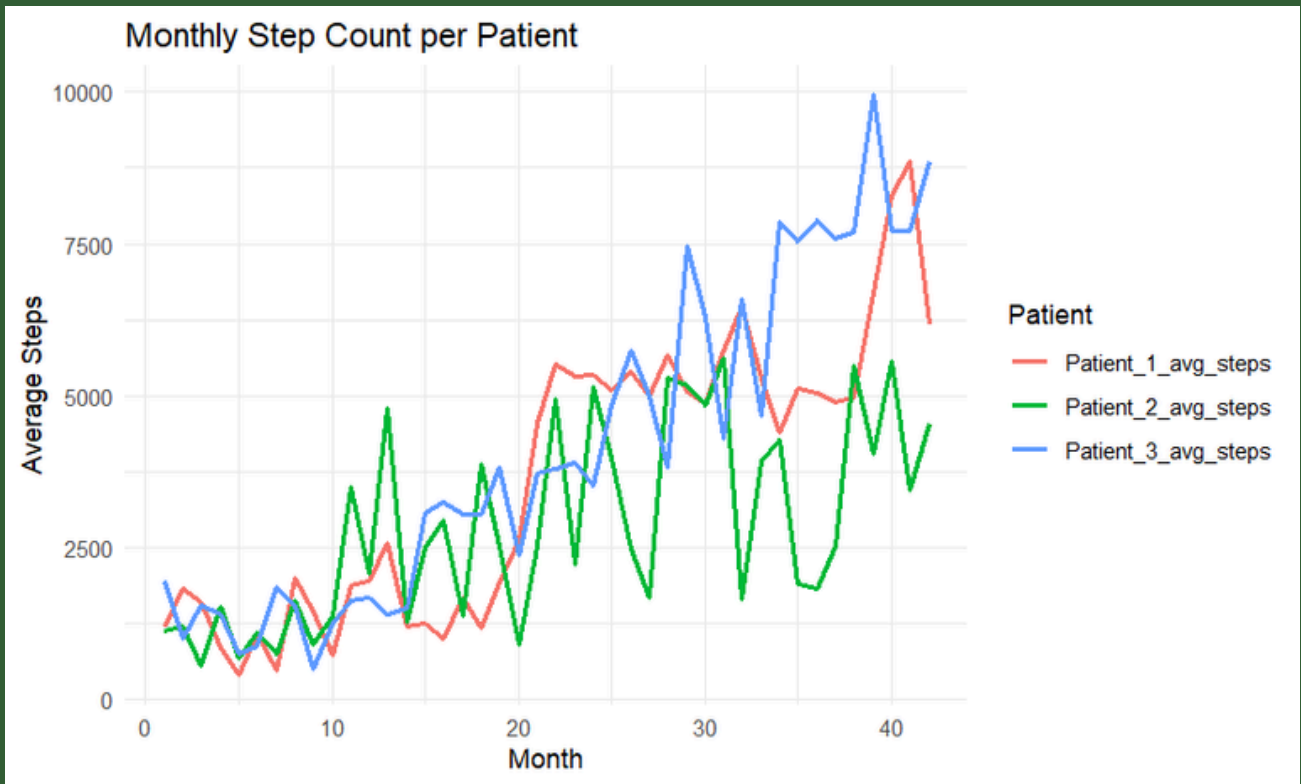
FIGURES

Figure 1: Monthly Step Count per Patient
- Trend: All patients exhibited a gradual increase in physical activity.
- Patient 1: Steady rise, peaking at ~9,000 steps/month.
- Patient 2: Fluctuating trend, ranging between 2,000–5,000 steps.
- Patient 3: Highest variability and peak (>10,000 steps), indicating significant lifestyle change.
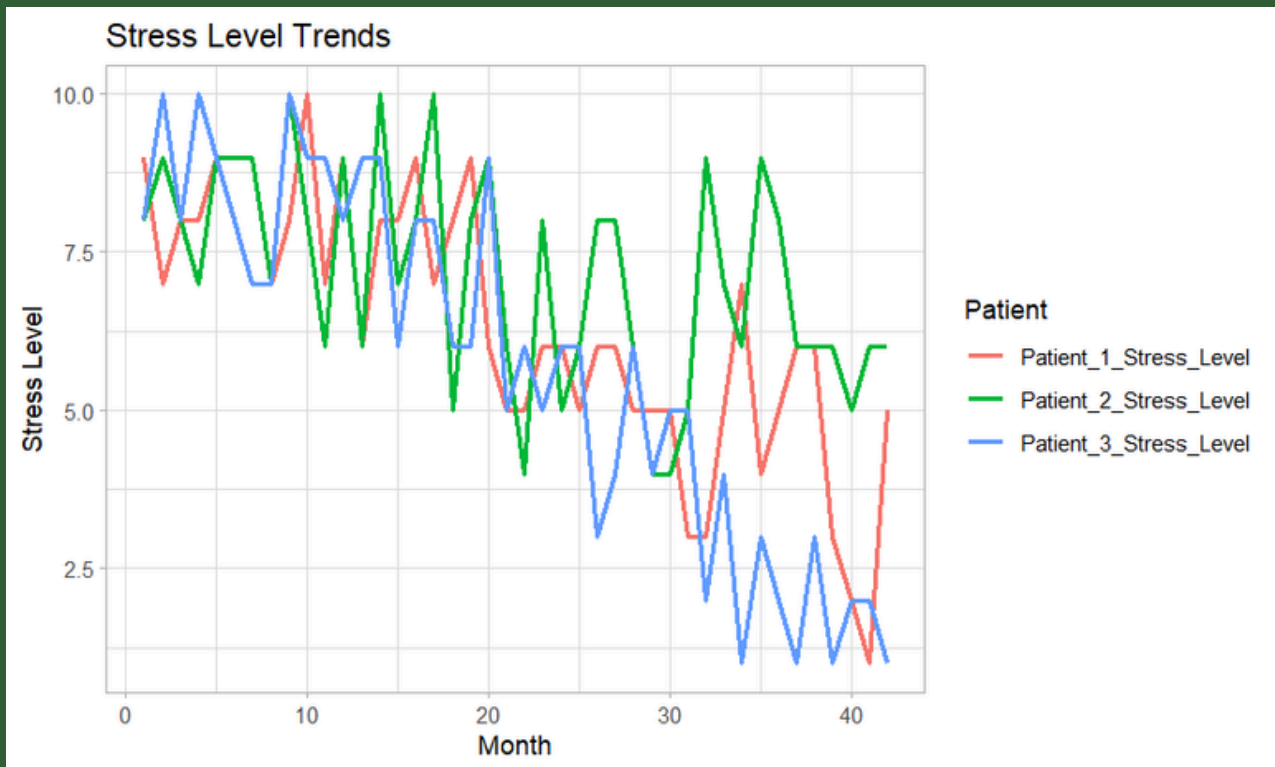
FIGURES

Figure 2: Stress Levels Over Time

- Overall: Downward trend in stress levels across all patients.
- Patient 1: Declined from ~7.5 to below 5.0.
- Patient 2: Erratic but decreased trend to ~5.0–6.0.
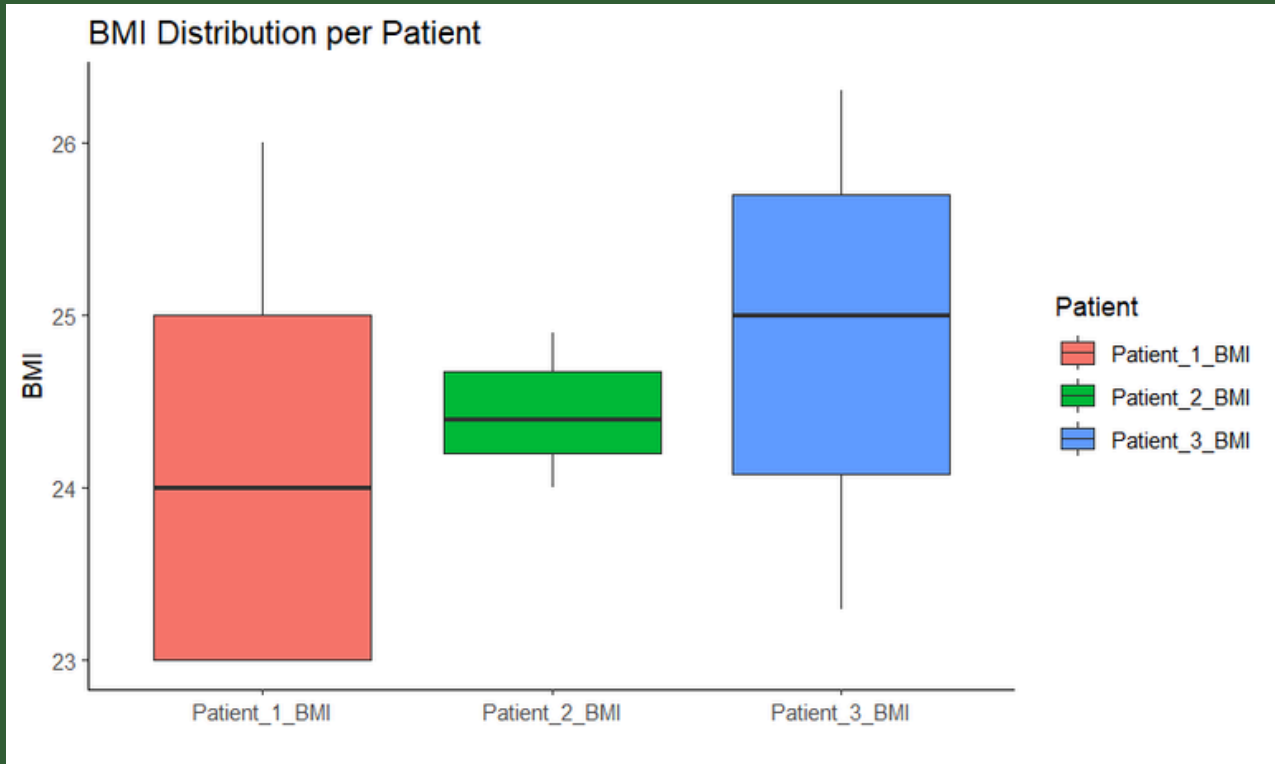- Patient 3: Strongest improvement, dropping stress to near 0 by Month 38.

FIGURES

Figure 3: BMI Boxplot per Patient
- Patient 1: Median ~24.0, mild variability.
- Patient 2: Very consistent BMI (~24.3) with tight range (24.2–24.6).
- Patient 3: Highest variability, median ~25.0, suggesting fluctuating weight status.

INTERPRETATION AND BRIEF CONCLUSION

This time series analysis revealed meaningful health trends over 42 months. Across all patients, physical activity increased and stress levels declined, affirming the positive relationship between regular exercise and mental well-being. Although BMI changes were subtler, the inter-individual differences in stability and variability offer insights into personalized health responses.

- Patient 3's drastic improvements suggest high responsiveness to lifestyle changes but warrant continued monitoring for weight consistency.
- Patient 2's steady BMI and moderate behavior changes demonstrate effective long-term maintenance.
- Patient 1's balanced changes may indicate gradual but sustainable progress.
- Continue longitudinal monitoring to identify individual patterns over longer periods.
- Integrate additional behavioral variables (e.g., sleep, diet) for a more holistic profile.
- Tailor interventions based on individual trends—those with variable BMI may benefit from focused weight management strategies.