Analyzing Consumer Fitness Behavior Using Bellabeat Data

Abstract

This case study analyzes publicly available Fitbit fitness tracker data to uncover patterns in daily activity, calorie expenditure, and sleep behavior. The goal is to extract meaningful insights that can inform Bellabeat’s wellness-product marketing and user engagement strategies. Three primary visualizations (daily steps distribution, calories vs. steps, and steps vs. sleep) were generated using Python for exploratory analysis.

1. Introduction

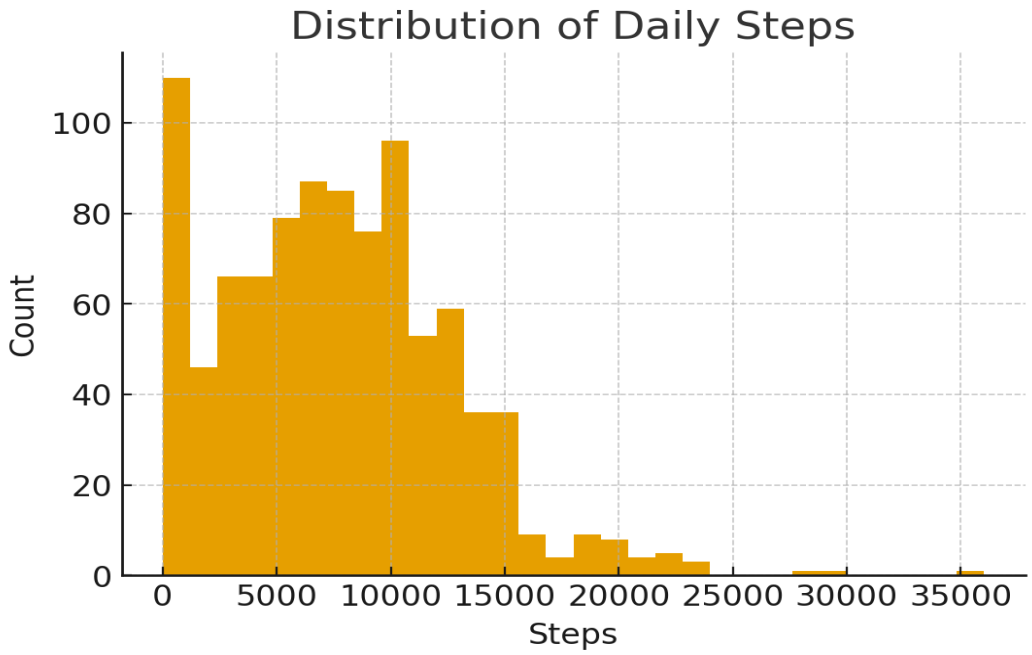
Bellabeat is a high-tech wellness company focused on empowering women through smart devices and data insights. This study explores how consumers behave in terms of steps, calorie expenditure, and sleep duration using publicly available Fitbit tracker data.

Research Questions:
• What does the distribution of daily steps reveal about overall activity levels?
• How strongly are daily steps associated with calories burned?
• Is there a noticeable relationship between daily steps and sleep duration?

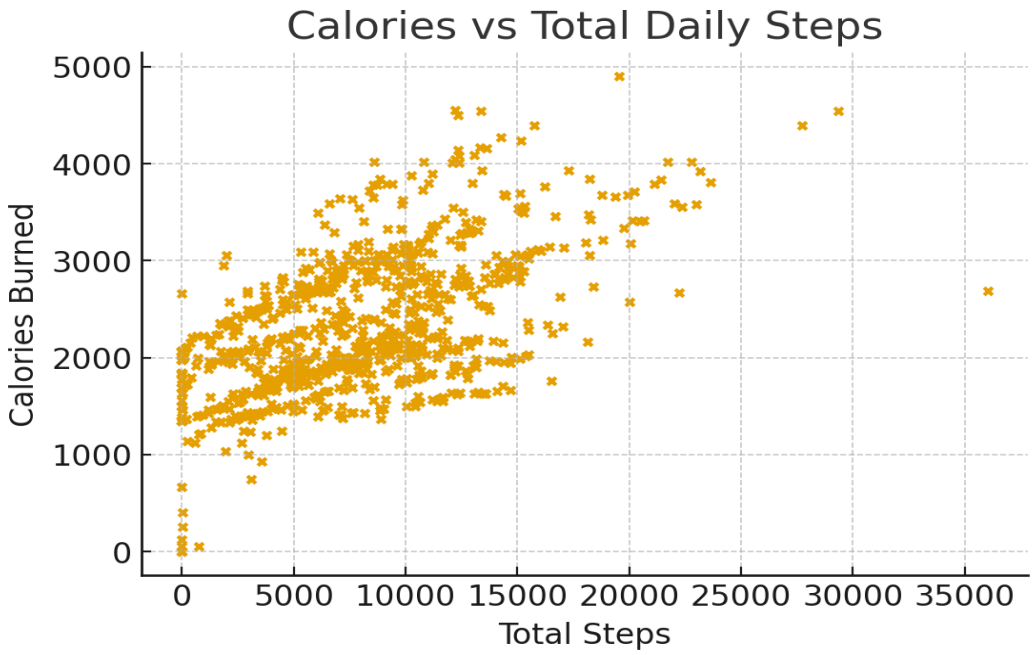
2. Methodology

Python was used for data cleaning, transformation, and visualization. The datasets include daily activity, daily steps, and sleep records. Dates were standardized, datasets were merged on participant ID and date, and missing or inconsistent data was handled accordingly.

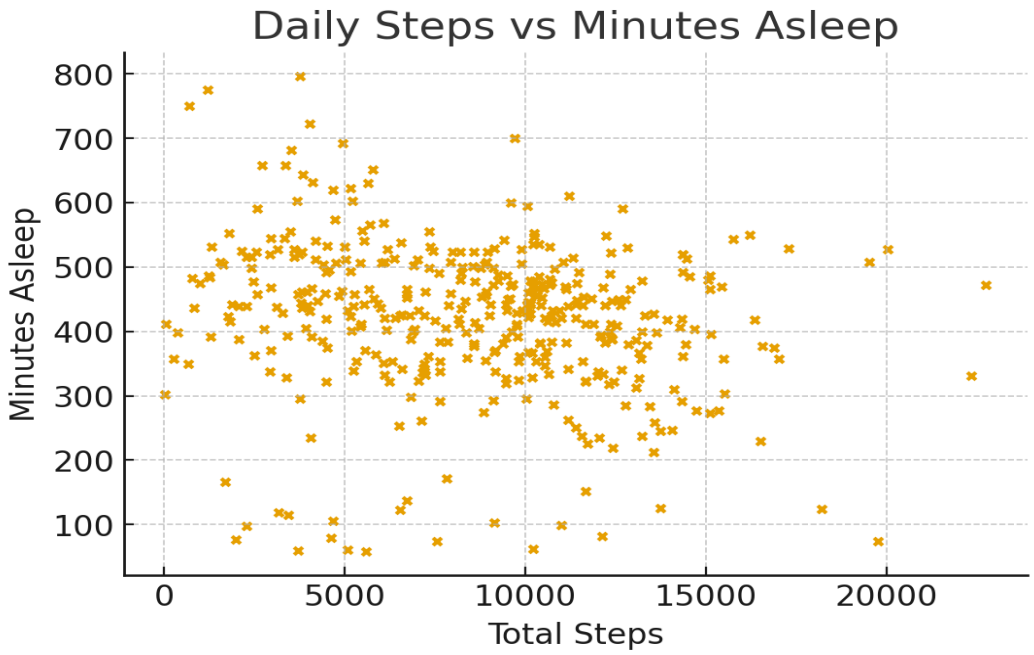
3.1 Distribution of Daily Steps



3.2 Calories vs Total Daily Steps



3.3 Daily Steps vs Minutes Asleep



4. Discussion

Analysis indicates that users typically average between 6,000 and 9,000 steps per day. Calorie expenditure shows a strong positive association with step count, suggesting that physical movement is the primary driver of energy expenditure in this dataset. The relationship between steps and sleep duration appears weak, which aligns with existing research showing that sleep is influenced by multiple physiological and environmental factors.

5. Recommendations

- Promote step-based challenges to encourage higher daily activity levels.
- Emphasize calorie-burn tracking in Bellabeat's smart-device marketing materials.
- Position sleep analytics as a complementary feature rather than activity-dependent.
- Encourage users to monitor long-term trends instead of daily fluctuations.

6. Conclusion

The findings of this case study provide key behavioral insights that can support Bellabeat's product positioning and marketing strategy. Increased activity correlates strongly with energy expenditure, while sleep duration does not appear to be influenced significantly by step count. These insights help shape a more effective wellness-focused user engagement approach.