Bellabeat Case Study – Fitbit Data Analysis

Tim Foltz – August 2025

Business Task

- Analyze Fitbit usage trends to understand consumer habits
- Apply insights to Bellabeat products to improve marketing strategies
- Deliver actionable recommendations based on data findings

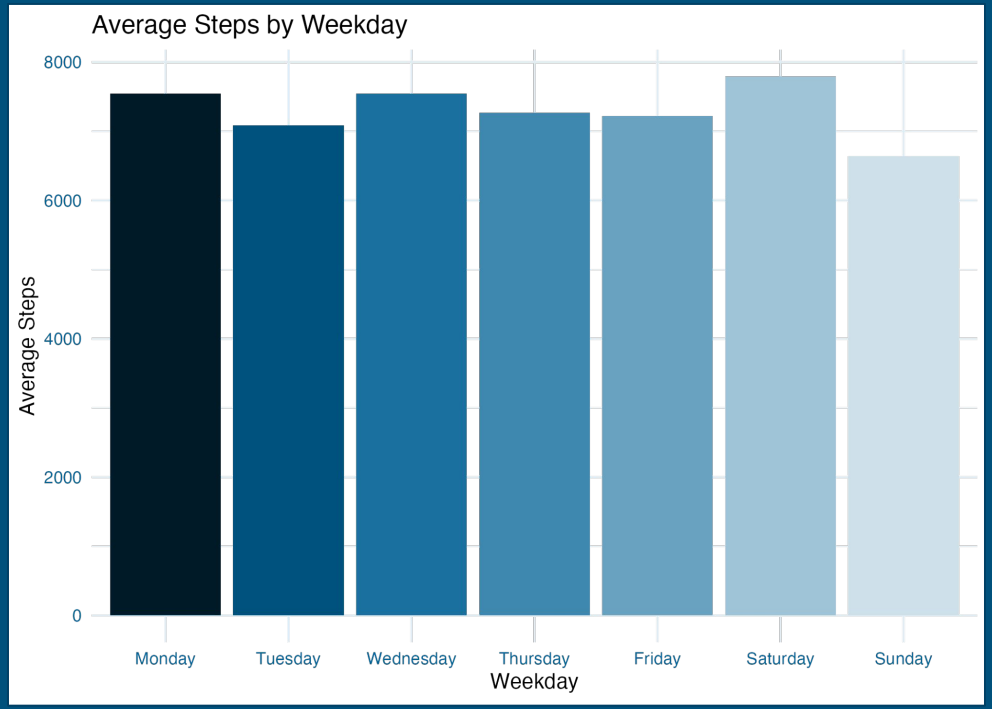
Data Sources

- Fitbit Fitness Tracker Dataset (CC0 Public Domain)
- ~30 participants with activity, sleep, and steps data
- Two periods of data in March–May 2016
- Some gaps in sleep and heart rate tracking

Methodology

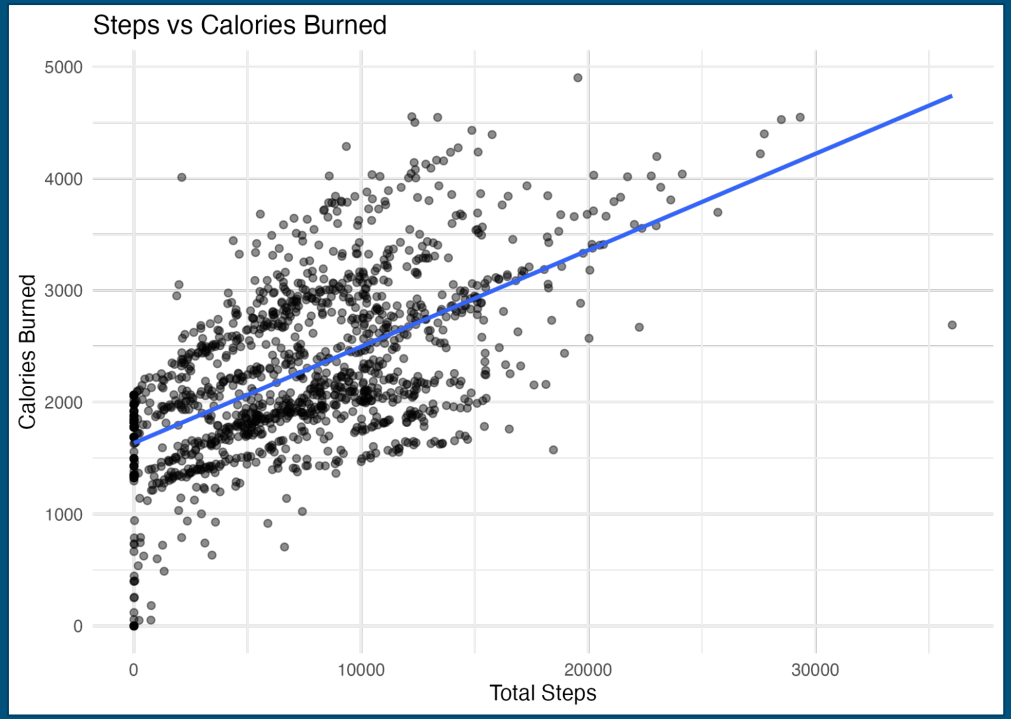
- Data cleaning, standardization, and merging across date ranges
- Derived helper columns (weekend/weekday, total active hours)
- Filtered outliers (e.g., calories >2500 with 0 steps)
- Explored patterns in activity, sleep, and calories

Plot 1 – Average Steps by Weekday



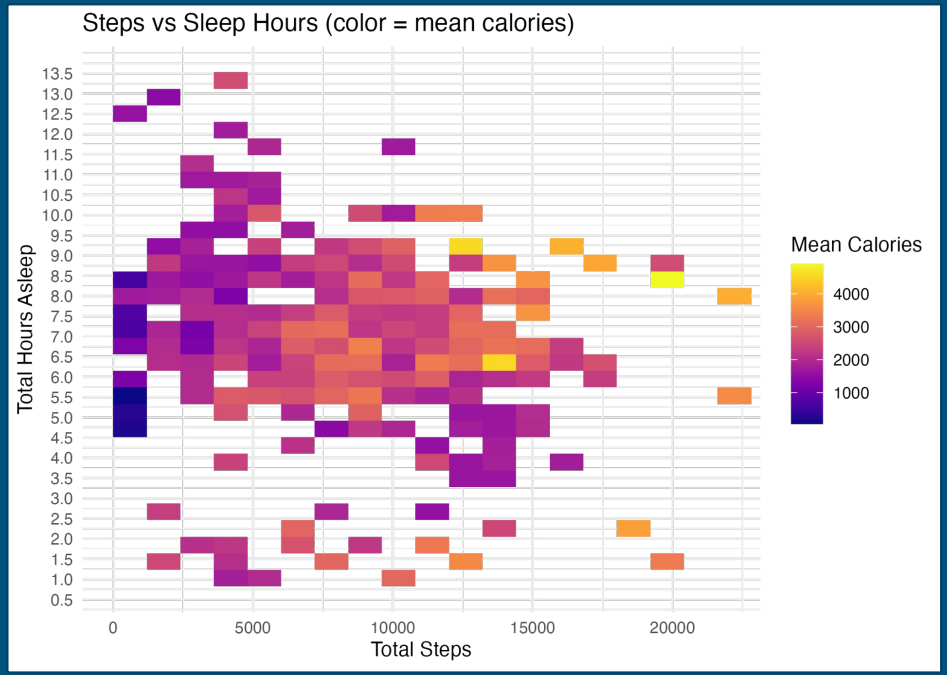
Participants took the most steps midweek, with Monday and Sunday having the lowest averages.Suggests potential for weekend activity campaigns.

Plot 2 – Steps vs Calories Burned



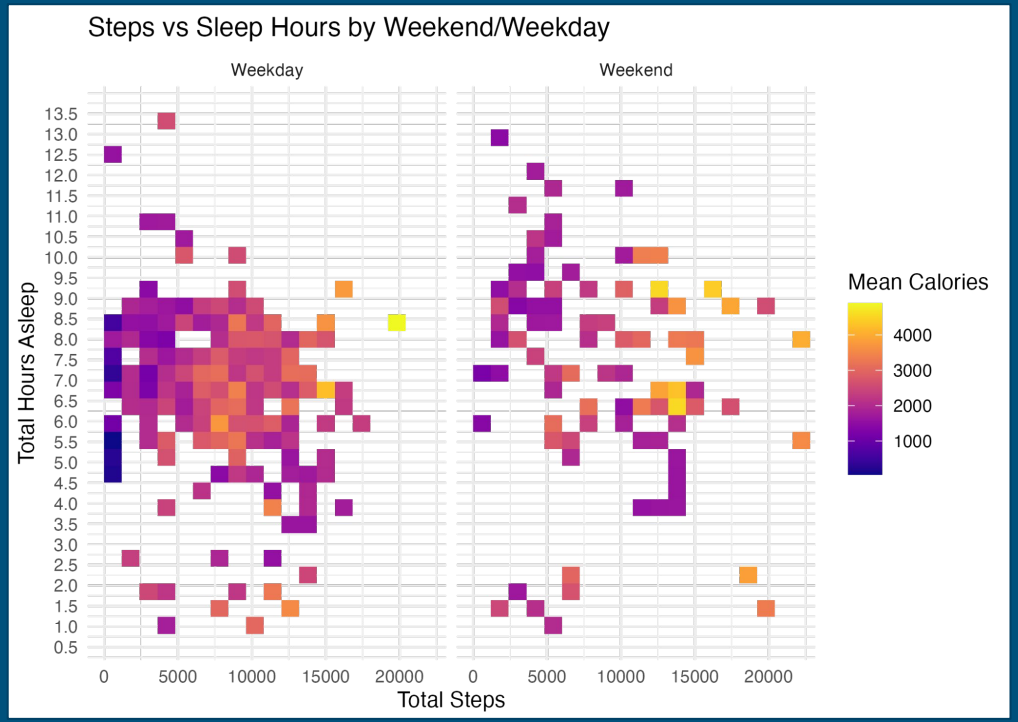
Clear positive relationship between steps and calories burned.
Calories burned > 0 at ~0 total steps could indicate logged workout without activity on Fitbit.

Plot 3 – Sleep Hours vs Steps (Color/Size by Calories)



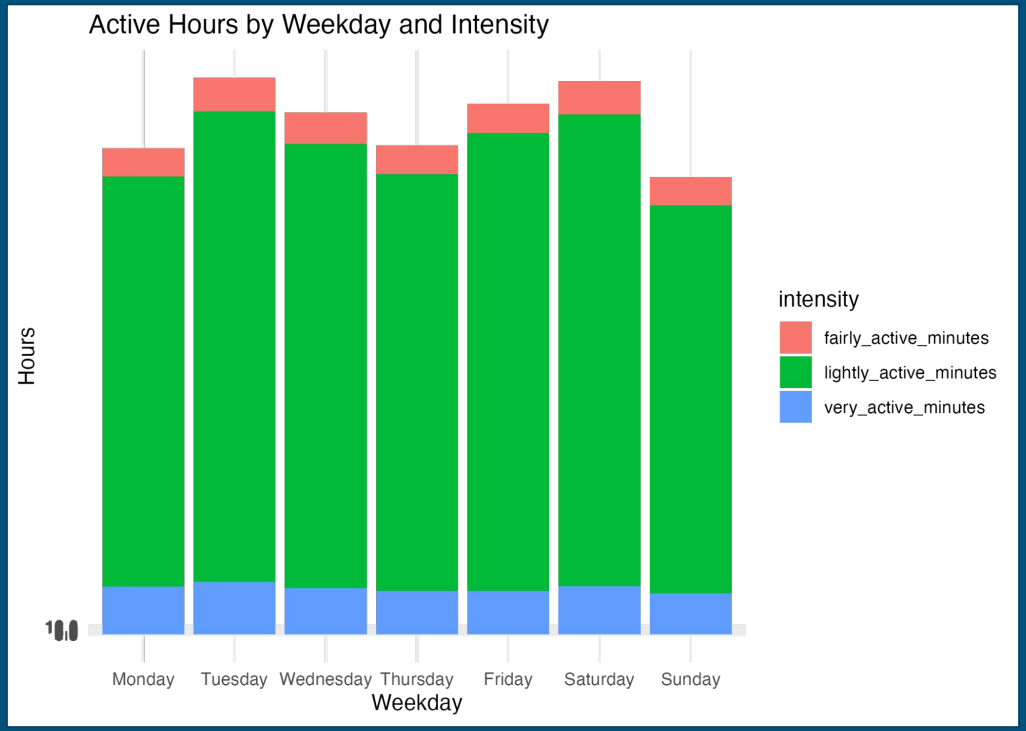
High calories concentrate with moderate–high steps and ~6–9 hours of sleep; very short sleep correlates with lower calories at similar steps.

Plot 4 – Weekend vs Weekday % ≥10k Steps



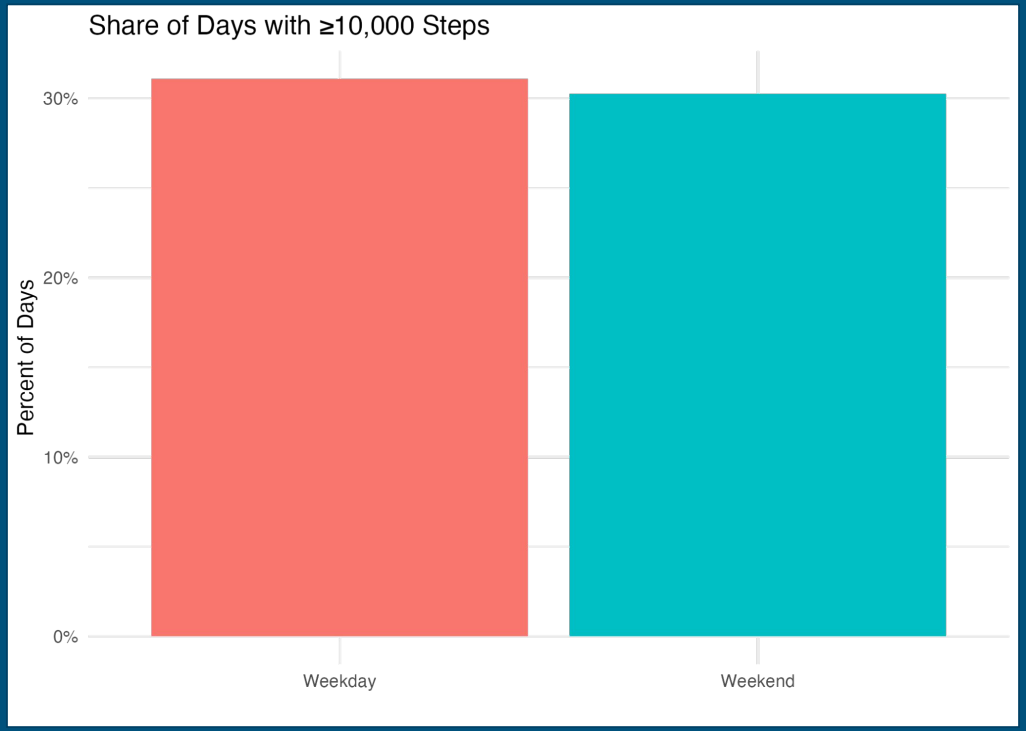
Weekdays show higher very active minutes, while weekends have more lightly active minutes.

Plot 5 – Active Hours Intensity



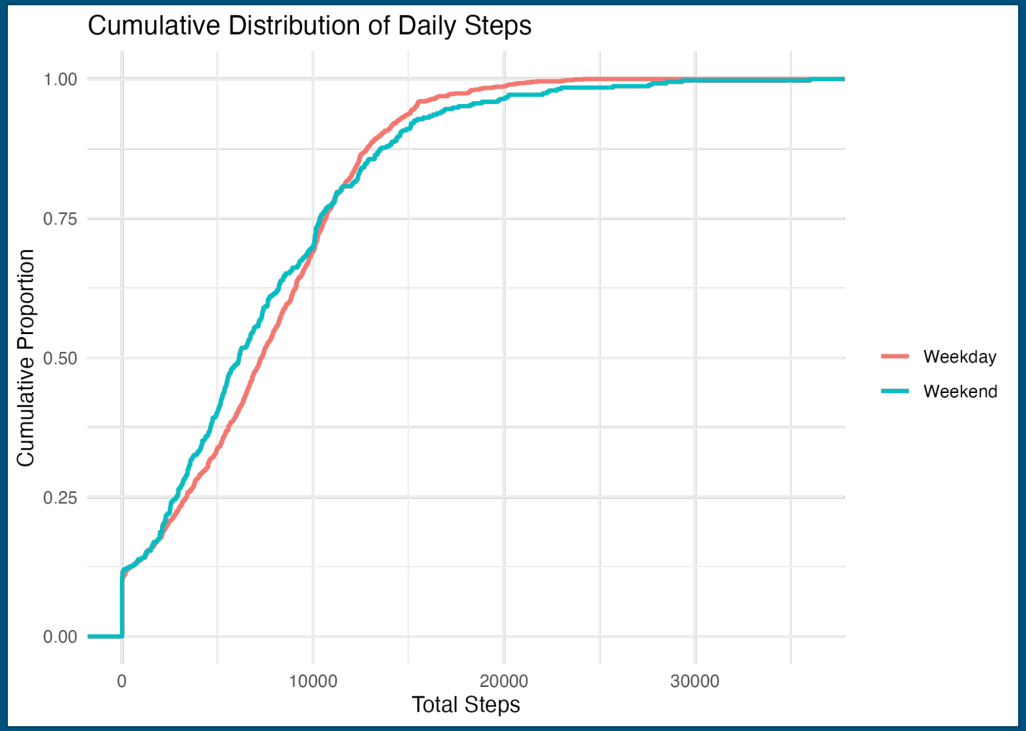
Light activity dominates; scope for micro-bursts of higher intensity without increasing total time burden.

Plot 6 – Percent of Days with 10k or More Steps



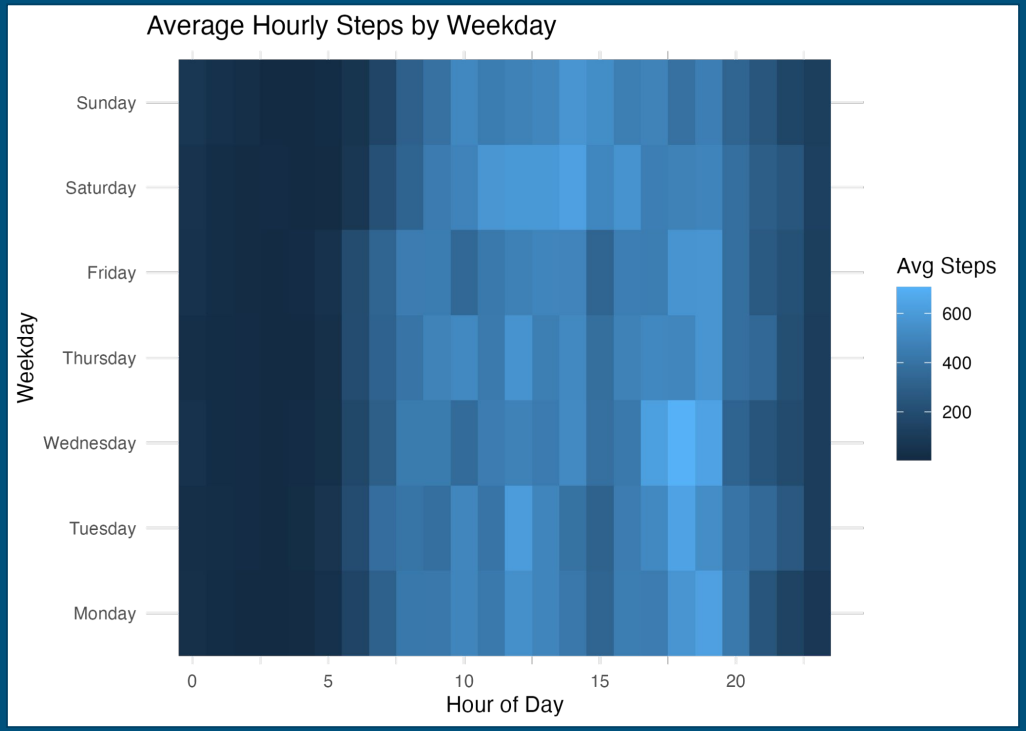
No significant variation from weekdays to weekends. Both share ~30%
Participants sleep longer on weekends, which may reduce time for physical activity.

Plot 7 – Distribution of Daily Steps



Read proportions at 10k to quantify weekend vs weekday goal attainment.

Plot 8 – Hourly Steps Heatmap



Typical day shows **moderate steps**, **~6–8 hours** of sleep, and calories aligned with daily steps + basal burn.
Sleep efficiency is stable overall; room to lift **fairly-active time** without extending total hours.

Key Findings

- Weekends show lower average steps compared to weekdays
- Steps strongly correlate with calories burned
- More sleep is modestly associated with higher next-day activity
- Peak activity occurs midday, with a secondary evening bump

Recommendations

- Weekend activation challenges to boost step counts
- Sleep coaching nudges for users sleeping <7h
- Badge rewards for mixed-intensity activity goals
- Personalized hydration/activity reminders during peak hours

Act – Next Steps

- Set KPIs: +10% weekend steps, +5% average active hours
- A/B test push notification timing for engagement
- Segment users by sleep/activity patterns for tailored messaging
- Request additional data: seasonal trends, demographics, campaign overlaps