Bellabeat Analysis Report

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Summary of the Business Task

The objective of this analysis is to examine Fitbit smart device usage data to identify trends in user activity, sleep, and overall wellness behaviour. By understanding how consumers use non-Bellabeat fitness trackers, these insights will be applied to Bellabeat products to inform data-driven marketing strategies. The ultimate goal is to uncover opportunities that can help Bellabeat improve user engagement, promote healthier habits, and support future growth.

Description of Data Sources Used

The primary data source used for this analysis is the *FitBit Fitness Tracker Data*, a public-domain dataset available on Kaggle. The dataset contains personal fitness tracker data collected from Fitbit users who consented to share their information.

Dataset Overview:

- Source: Kaggle (uploaded by Möbius)
- License: CC0 – Public Domain
- Format: 18 CSV files
- Data granularity (level of detail): Daily, hourly, and minute-level activity, sleep, heart rate, and weight data
- Technical Data Types: Quantitative (integers/floats for steps/calories etc) and Qualitative (Date/Time, strings and User IDs)

Key Details:

- Participants: Although the dataset documentation references 30 users, data validation revealed records for 33 unique users in daily activity files and approximately 24 users in sleep data.
- Timeframe: Data was collected over one month, from April 12, 2016, to May 12, 2016.
- Collection Method: Data was gathered via a distributed survey conducted through Amazon Mechanical Turk, where participants voluntarily shared their Fitbit data.
- Data Structure: The dataset includes both long and wide formats, depending on the file (e.g., minute-level vs daily summaries).

Data Credibility Assessment (ROCCC Framework)

- Reliable**:** The data comes from real Fitbit users who consented to share their data. However, the small sample size limits generalizability.
- Original: The data was originally generated by Fitbit devices and later published by Möbius on Kaggle, making it a second-party dataset.

- Comprehensive: The dataset includes detailed activity, heart rate, and sleep data. A key limitation is the absence of demographic information (e.g., age, gender, location), which is particularly important given Bellabeat's focus on women.
- Current: The data was collected in 2016, meaning trends may not fully reflect current smart device usage patterns.
- Cited: The dataset is well-documented and openly available under a public-domain license.

Data Completeness Consideration*:* Not all users tracked every metric consistently. For example, only 24 users recorded sleep data, and only 8 users logged weight. Due to the limited sample size, weight data was excluded from analysis.

Documentation of Data Cleaning and Processing

Tools Used**:** Microsoft Excel, SQL Server, Power BI

Data Cleaning in Excel:

- Removed duplicate records
- Converted date columns from text to proper date formats
- Checked for missing or null values using filters
- Used Power Query to merge related datasets prior to SQL import

Data Processing in SQL Server:

- Imported cleaned CSV files into SQL Server
- Converted numeric fields from string data types to appropriate integer and float formats
- Created SQL views to aggregate and structure data for analysis and visualization
- Performed joins between activity and sleep datasets to explore relationships

All cleaning and transformation steps were documented to ensure transparency and reproducibility.

Summary of Analysis

The analysis focused on identifying patterns in user activity levels, sleep behaviour, and daily routines. Key findings include:

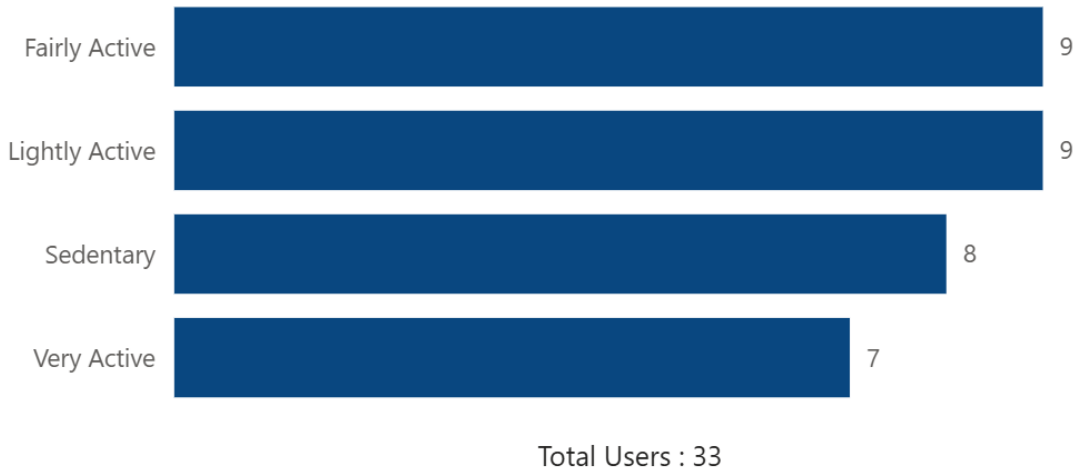
- Users average approximately 7,600 steps per day, indicating that many users fall below commonly recommended activity thresholds.
- Activity levels vary across the week, with higher average steps recorded on weekends, particularly Saturdays.

- Users can be categorized into sedentary, lightly active, fairly active, and very active groups, with a large portion falling into the fairly or lightly active categories.
- Activity intensity peaks during morning and early evening hours, reflecting common workout and commuting times.
- Analysis of sleep and activity shows no strong linear relationship, suggesting that higher physical activity does not automatically lead to longer sleep duration.

Supporting Visualizations and Key Findings

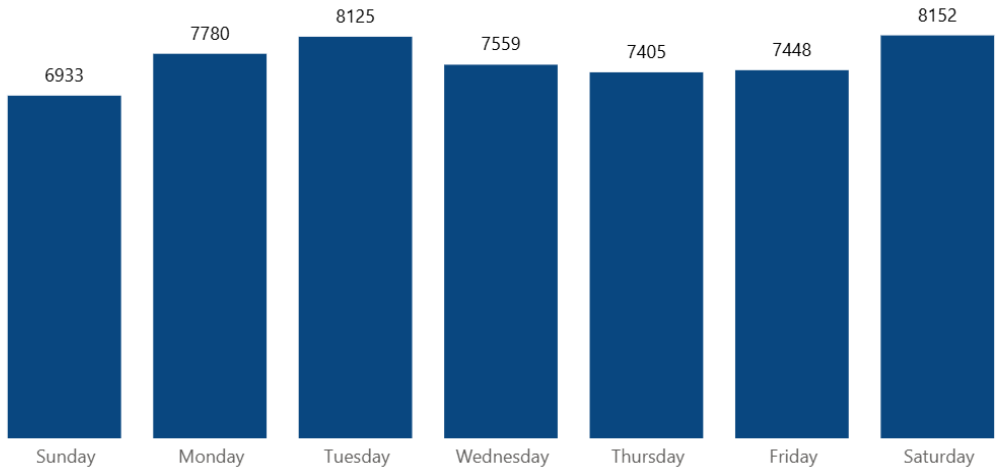
The following visualizations were created in Power BI to communicate insights clearly:

1. User Activity Categories



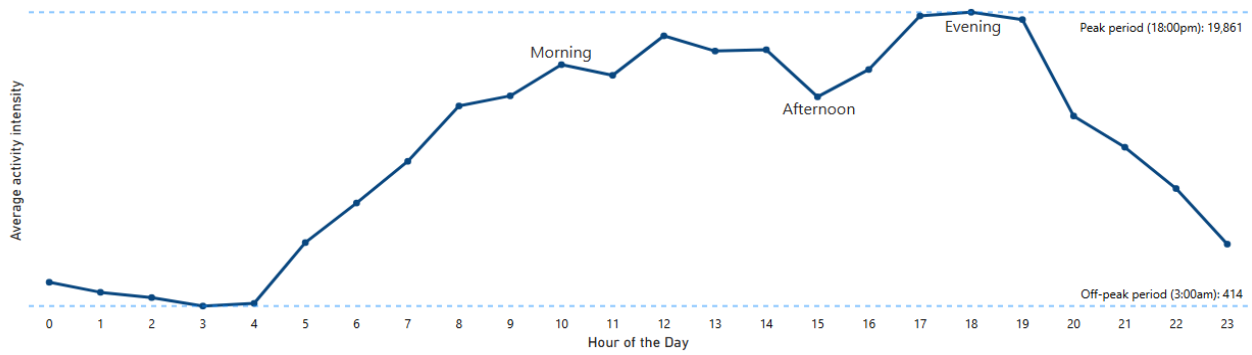
Key finding: A significant proportion of users fall into the fairly and lightly active categories. Insight: There is a strong opportunity to encourage gradual habit-building rather than high-intensity workouts.

2. Activity by weekday



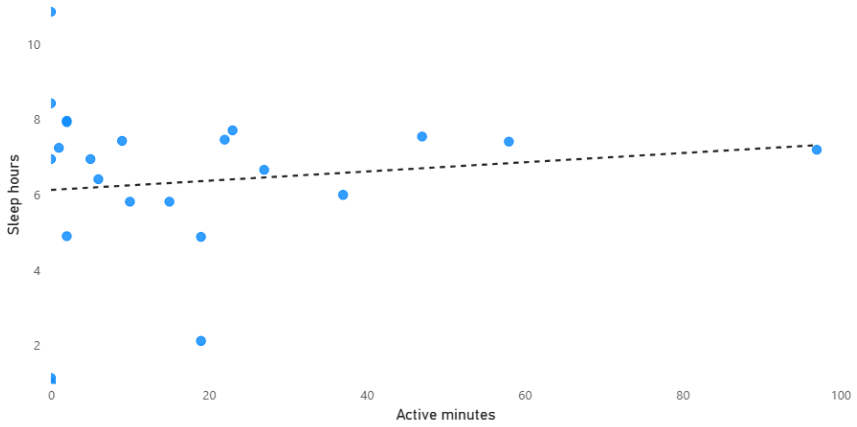
Key finding: Highest activity levels observed on Saturdays while Lower activity is observed on Sundays on some weekdays. Insight: Weekend-focused engagement strategies may be effective.

3. Activity peak period



Key findings: User activity intensity peaks in the morning and early evening hours. Insight: These time windows represent optimal opportunities for Bellabeat to send workout reminders or motivational notifications.

4. Sleep vs Activity Scatterplot:



Key findings: The scatterplot shows a weak relationship between physical activity and sleep duration. Insight: Increased activity does not necessarily translate into longer sleep, highlighting the need for balanced wellness messaging.

Recommendations

Based on the analysis, the following recommendations are proposed for Bellabeat' s marketing strategy:

1. **Position Bellabeat's Marketing Around Balanced Wellness**

   Bellabeat should frame its marketing messaging around holistic wellness by promoting consistent physical activity, adequate rest, and stress management. Rather than emphasizing intense workouts, marketing campaigns should highlight sustainable habits that support long-term well-being and align with Bellabeat's brand identity.
2. **Implement Time-Based Marketing Engagement Strategies**

Marketing notifications and in-app promotional messages should be strategically scheduled during early morning and early evening periods, when user activity levels are highest. Aligning marketing outreach with peak engagement times can increase message visibility, relevance, and response rates.

3. **Develop Targeted Campaigns for Fairly Active and Lightly Active Users**

   Bellabeat should design beginner-friendly marketing campaigns aimed at fairly and lightly active users. These campaigns should focus on achievable wellness goals, such as short walks or gentle daily movement, to encourage gradual behaviour change and build long-term user engagement.

4. **Personalize Marketing Content Using User Behaviour Insights**

   Insights from user activity patterns should be leveraged to personalize in-app marketing content and recommendations. Tailored messaging based on user behaviour can enhance user experience, strengthen brand loyalty, and improve retention rates.