Bellabeat: A Data-Driven Approach to Marketing Strategy

An Analysis of Smart Device Usage to Inform Growth Opportunities

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1. A Clear Summary of the Business Task

The objective of this analysis is to identify trends in how consumers use non-Bellabeat smart devices. By understanding these broader market trends, we can gain valuable insights that will help guide Bellabeat's marketing strategy. This report will analyze publicly available fitness tracker data to answer key questions about user habits and present high-level recommendations for how these insights can be applied to a specific Bellabeat product to unlock new growth opportunities.

Business tasks can be accessed at the following link:

https://github.com/Burhanudin26/Google-Data-Analytics/tree/main/Case%202

2. A Description of All Data Sources Used

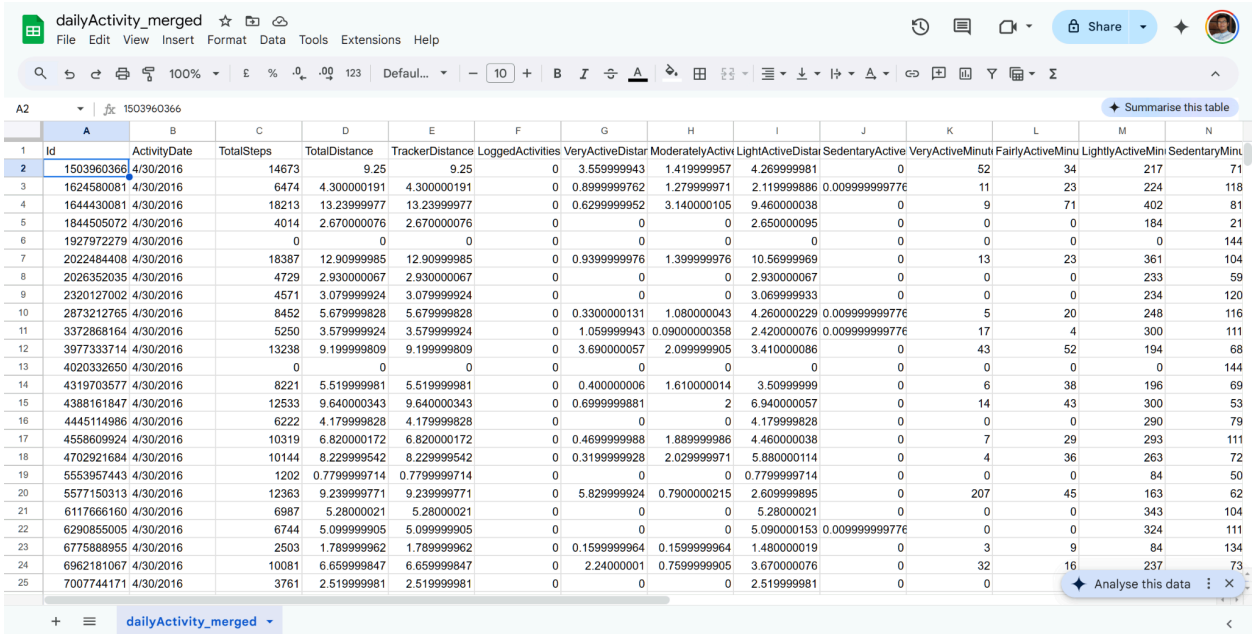
The primary dataset used for this analysis is the **FitBit Fitness Tracker Data**, publicly available on Kaggle. This dataset contains personal fitness data from thirty eligible Fitbit users who consented to the submission of their information. It includes minute-level output for physical activity, heart rate, and sleep monitoring, as well as daily totals for activity, steps, and calories burned.

Limitations: It is important to note that this dataset has some limitations. The sample size of 30 users is not large enough to be fully representative of the entire smart device market. However, it is a valuable and relevant public dataset that can provide directional insights into user habits and serve as a strong starting point for this analysis.

The dataset used can be accessed at the following link:

https://www.kaggle.com/datasets/arashnic/fitbit

The datasets used are dailyActivity_merged in Fig 1. and sleepDay_merged in Fig 2.



dailyActivity_merged

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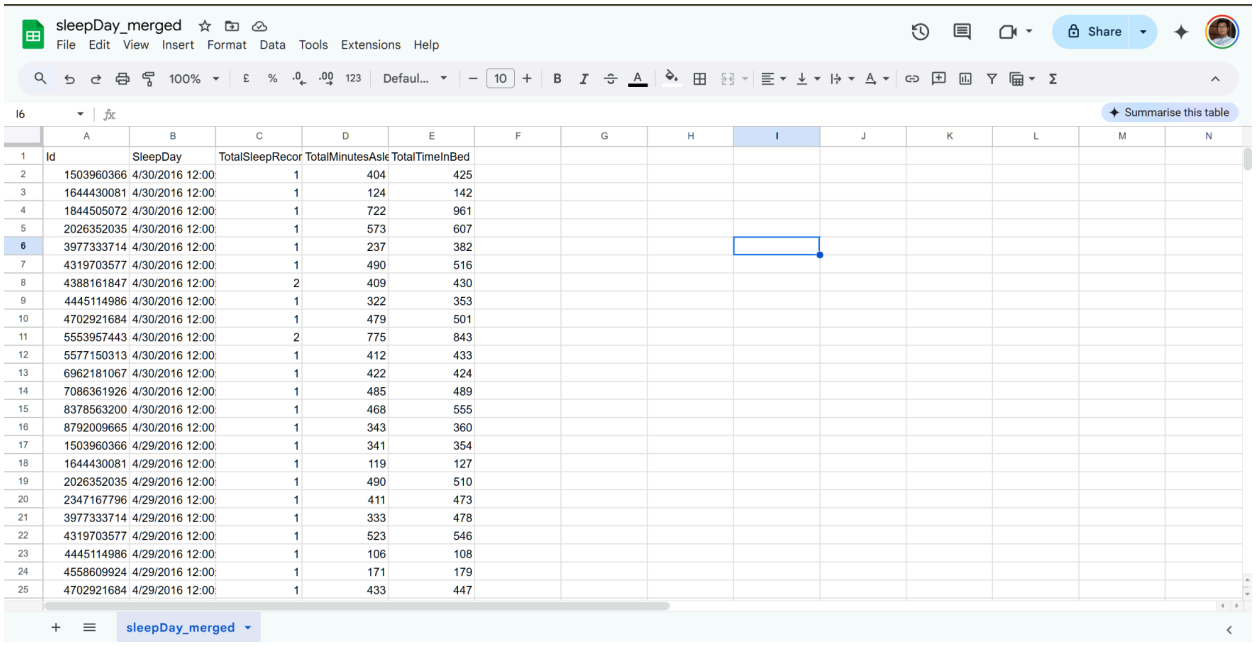
Summarise this table

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Id	ActivityDate	TotalSteps	TotalDistance	TrackerDistance	LoggedActivities	VeryActiveDistar	ModeratelyActiv	LightActiveDistar	SedentaryActive	VeryActiveMinut	FairlyActiveMinu	LightlyActiveMin	SedentaryMinu
2	1503960366	4/30/2016	14673	9.25	9.25	0	3.559999943	1.419999957	4.269999981	0	52	34	217	71
3	1624580081	4/30/2016	6474	4.300000191	4.300000191	0	0.8999999762	1.279999971	2.119999886	0.009999999776	11	23	224	118
4	1644430081	4/30/2016	18213	13.23999977	13.23999977	0	0.6299999952	3.140000105	9.460000038	0	9	71	402	81
5	1844505072	4/30/2016	4014	2.670000076	2.670000076	0	0	0	2.650000095	0	0	0	184	21
6	1927972279	4/30/2016	0	0	0	0	0	0	0	0	0	0	0	144
7	2022484408	4/30/2016	18387	12.90999985	12.90999985	0	0.9399999976	1.399999976	10.56999969	0	13	23	361	104
8	2026352035	4/30/2016	4729	2.930000067	2.930000067	0	0	0	2.930000067	0	0	0	233	59
9	2320127002	4/30/2016	4571	3.079999924	3.079999924	0	0	0	3.069999933	0	0	0	234	120
10	2873212765	4/30/2016	8452	5.679999828	5.679999828	0	0.3300000131	1.080000043	4.260000229	0.009999999776	5	20	248	116
11	3372868164	4/30/2016	5250	3.579999924	3.579999924	0	1.059999943	0.09000000358	2.420000076	0.009999999776	17	4	300	111
12	3977333714	4/30/2016	13238	9.199999809	9.199999809	0	3.690000057	2.099999905	3.410000086	0	43	52	194	68
13	4020332650	4/30/2016	0	0	0	0	0	0	0	0	0	0	0	144
14	4319703577	4/30/2016	8221	5.519999981	5.519999981	0	0.400000006	1.610000014	3.50999999	0	6	38	196	69
15	4388161847	4/30/2016	12533	9.640000343	9.640000343	0	0.6999999881	2	6.940000057	0	14	43	300	53
16	4445114986	4/30/2016	6222	4.179999828	4.179999828	0	0	0	4.179999828	0	0	0	290	79
17	4558609924	4/30/2016	10319	6.820000172	6.820000172	0	0.4699999988	1.889999986	4.460000038	0	7	29	293	111
18	4702921684	4/30/2016	10144	8.229999542	8.229999542	0	0.3199999928	2.029999971	5.880000114	0	4	36	263	72
19	5553957443	4/30/2016	1202	0.7799999714	0.7799999714	0	0	0	0.7799999714	0	0	0	84	50
20	5577150313	4/30/2016	12363	9.239999771	9.239999771	0	5.829999924	0.7900000215	2.609999895	0	207	45	163	62
21	6117666160	4/30/2016	6987	5.28000021	5.28000021	0	0	0	5.28000021	0	0	0	343	104
22	6290855005	4/30/2016	6744	5.099999905	5.099999905	0	0	0	5.090000153	0.009999999776	0	0	324	111
23	6775888955	4/30/2016	2503	1.789999962	1.789999962	0	0.1599999964	0.1599999964	1.480000019	0	3	9	84	134
24	6962181067	4/30/2016	10081	6.659999847	6.659999847	0	2.24000001	0.7599999905	3.670000076	0	32	16	237	73
25	7007744171	4/30/2016	3761	2.519999981	2.519999981	0	0	0	2.519999981	0	0			

Analyse this data

dailyActivity_merged

Fig 1. dailyActivity_merged



sleepDay_merged

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Summarise this table

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Id	SleepDay	TotalSleepRecor	TotalMinutesAsle	TotalTimeInBed									
2	1503960366	4/30/2016 12:00:	1	404	425									
3	1644430081	4/30/2016 12:00:	1	124	142									
4	1844505072	4/30/2016 12:00:	1	722	961									
5	2026352035	4/30/2016 12:00:	1	573	607									
6	3977333714	4/30/2016 12:00:	1	237	382									
7	4319703577	4/30/2016 12:00:	1	490	516									
8	4388161847	4/30/2016 12:00:	2	409	430									
9	4445114986	4/30/2016 12:00:	1	322	353									
10	4702921684	4/30/2016 12:00:	1	479	501									
11	5553957443	4/30/2016 12:00:	2	775	843									
12	5577150313	4/30/2016 12:00:	1	412	433									
13	6962181067	4/30/2016 12:00:	1	422	424									
14	7086361926	4/30/2016 12:00:	1	485	489									
15	8378563200	4/30/2016 12:00:	1	468	555									
16	8792009665	4/30/2016 12:00:	1	343	360									
17	1503960366	4/29/2016 12:00:	1	341	354									
18	1644430081	4/29/2016 12:00:	1	119	127									
19	2026352035	4/29/2016 12:00:	1	490	510									
20	2347167796	4/29/2016 12:00:	1	411	473									
21	3977333714	4/29/2016 12:00:	1	333	478									
22	4319703577	4/29/2016 12:00:	1	523	546									
23	4445114986	4/29/2016 12:00:	1	106	108									
24	4558609924	4/29/2016 12:00:	1	171	179									
25	4702921684	4/29/2016 12:00:	1	433	447									

sleepDay_merged

Fig 2. sleepDay_merged

3. Documentation of Any Cleaning or Manipulation of Data

To prepare the FitBit data for analysis, the following steps were taken using **R programming** and packages from the **Tidyverse** suite:

1. **Data Import and Initial Exploration:** The multiple CSV files were imported into RStudio

and combined into single dataframes where appropriate.

2. **Data Cleaning and Verification:** The data was checked for errors, inconsistencies, duplicates, and missing values. Functions from the dplyr package were used to inspect and clean the data.
3. **Data Formatting:** Date and time columns were converted from character strings to a consistent datetime format using the lubridate package to allow for accurate time-series analysis.
4. **Data Transformation:** The raw data was transformed to create new, more useful variables for analysis. For example, creating categorical columns for different levels of activity (e.g., sedentary, lightly active, very active) and extracting the day of the week from the date. The entire cleaning process was documented in the R script to ensure the analysis is transparent and reproducible.

4. A Summary of Your Analysis

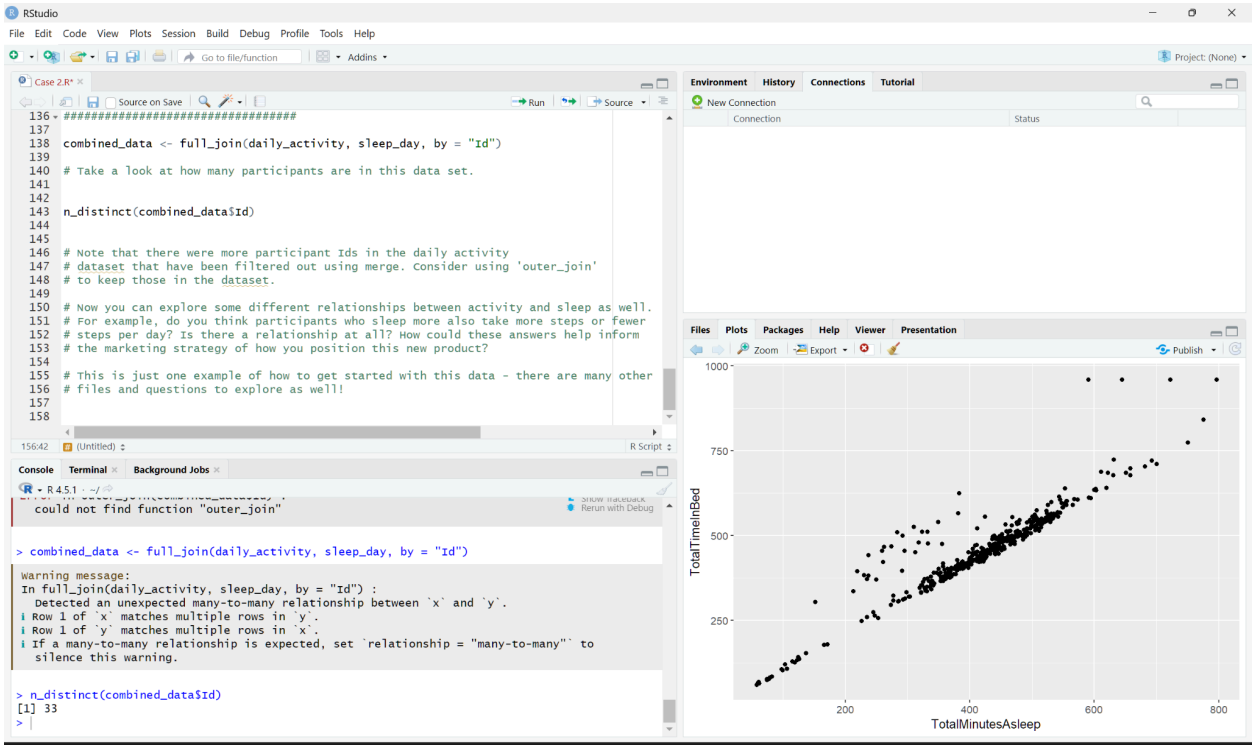

Fig 3. Analysis data in R studio

A descriptive analysis of the FitBit data was conducted in **R** to identify key trends and patterns in user behavior. The analysis focused on:

- **Activity Levels:** Using dplyr, the data was grouped by user to calculate summary statistics (mean, median, min, max) for daily steps, distances, and calories burned.
- **Sleep Patterns:** The analysis examined sleep records to calculate the average time spent in bed versus actual time asleep, identifying patterns in sleep efficiency.
- **Usage Frequency:** The number of days each participant recorded data was analyzed to

understand how consistently users wear and interact with their devices.

- **Correlations:** The cor() function was used to investigate potential relationships between different variables, such as the correlation between total steps and calories burned, or between sedentary time and sleep quality.

5. Supporting Visualizations and Key Findings

The key findings from the analysis are presented with clear and compelling data visualizations created using the `ggplot2` package in **R**. These visualizations are designed to effectively communicate the main insights to the Bellabeat executive team.

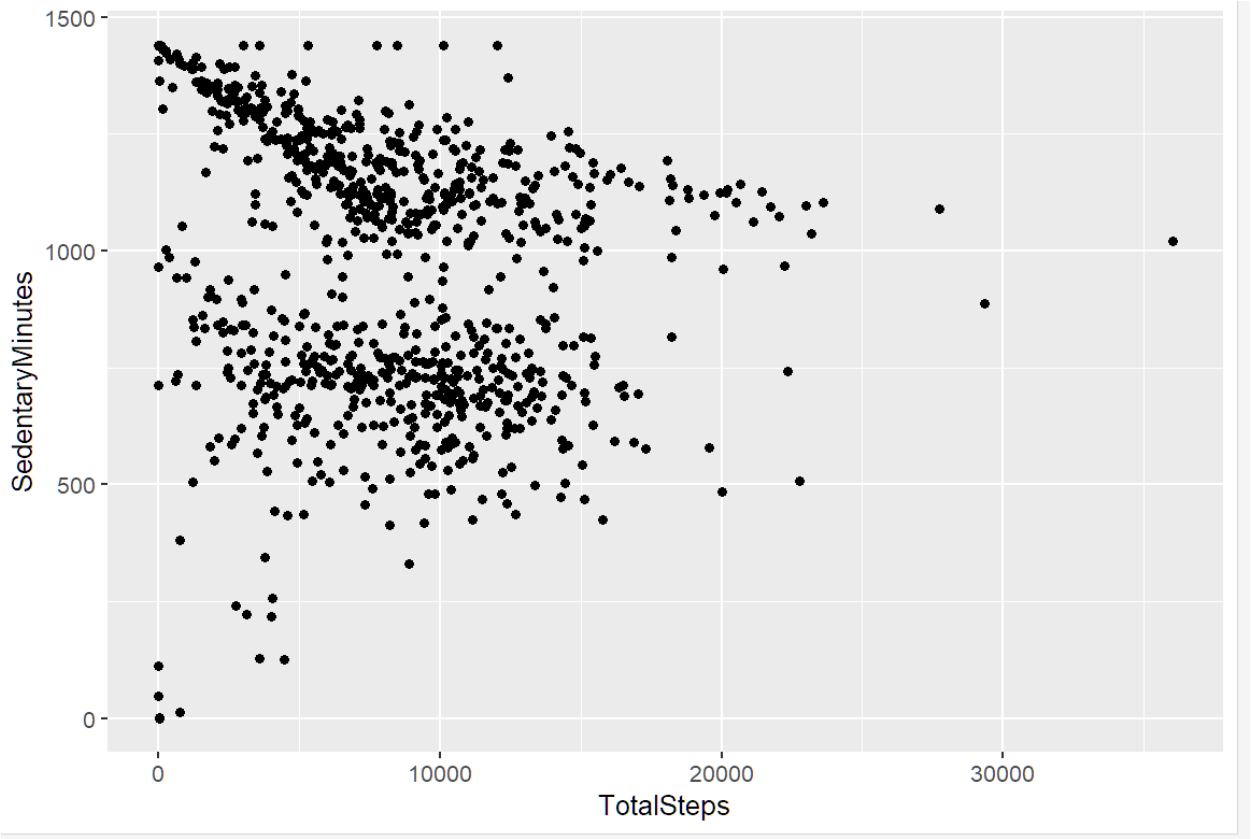

Fig 4. Relationship Between Daily Steps and Sedentary Time

- **Key Finding 1:** There is a clear negative correlation between the total steps a user takes and their total sedentary minutes. As activity (steps) increases, inactive time (sedentary minutes) decreases. This highlights a fundamental opportunity to market products based on the goal of reducing sedentary time by increasing daily movement.

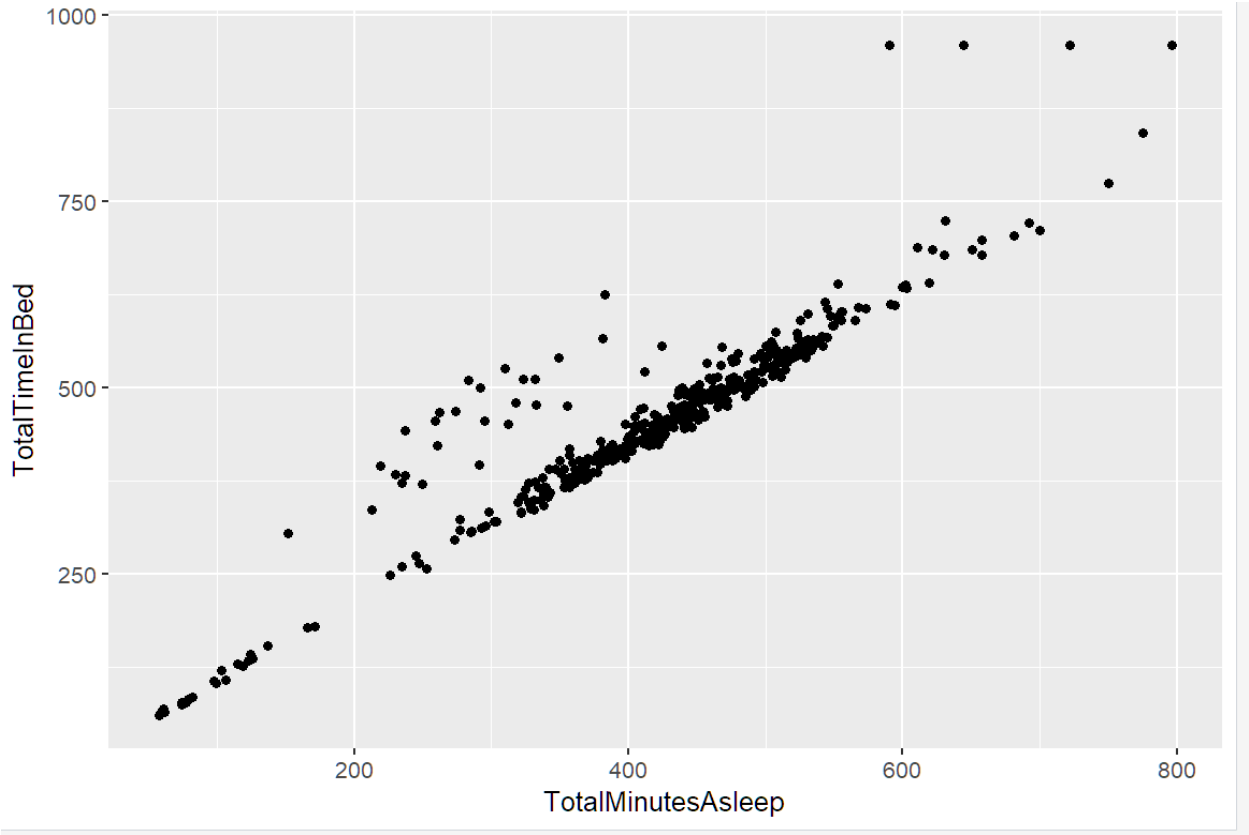

Fig 5. Relationship Between Time in Bed and Time Asleep

- **Key Finding 2:** There is a strong positive correlation between the total time users spend in bed and their total minutes asleep. However, the data consistently shows a gap between these two metrics, where users are awake in bed for a significant amount of time. This indicates a key opportunity to focus on sleep quality and efficiency, not just sleep duration.

6. Your Top High-Level Content Recommendations Based on Your Analysis

Based on the analysis of smart device usage trends, the following high-level recommendations are proposed to influence Bellabeat's marketing strategy, with a focus on the **Bellabeat Leaf** wellness tracker:

- **Recommendation 1: Market the Leaf as a Tool to Improve Overall Well-being, Not Just Track Metrics.**
    - **Rationale:** The data shows clear links between daily habits (activity and sleep). Bellabeat can position the Leaf as a holistic wellness device. Marketing should emphasize how increasing daily steps (Finding 1) can lead to better sleep, and how better sleep (Finding 2) can lead to more energy for activity, creating a positive wellness cycle.

- **Recommendation 2: Develop App Features and Content Focused on Sleep Efficiency.**
    - **Rationale:** Finding 2 shows a clear need for improving sleep quality. Bellabeat can differentiate itself by focusing on this. The Bellabeat app could offer personalized insights into the "Time in Bed vs. Time Asleep" gap, provide guided meditations, or create content with actionable tips to help users fall asleep faster and improve their sleep efficiency.