

Exploratory Data Analysis: Fitbit Customer Data to Level Up Bellabeat Ivy Marketing

Executive Summary

Analysis conducted on Fitbit data from 18 participants in April 2016 shows activity and caloric expenditure trends and relationships which inform potential product enhancements for the Bellabeat Ivy. Through examining caloric expenditure and levels of activity intensity, the data shows that users tended to prefer lower intensity exercises. Visualizing varying activity intensities has shown that users tend to spend most of their time sedentary and prefer light levels of activity over moderate to intense activities. Additionally, analysis comparing total steps with sedentary minutes does not show a clear relationship but depicts that the majority of participants generally spent between 10-23 hours sedentary and a third of the participants did not average 7,500 steps a day.

Recommendations:

- Establish ongoing record of light activities users have preferences towards
- Discover unique activity metrics tracking for users to view their progress and improvements
- Implement a feature which gives the user the option to schedule activity at optimal times of the day and get a friendly reminder to get active
- Implement a program or feature which allows users to discover new ways to stay active
- Provide tutorials or direct users to the proper resources to learn new activities
- Create a rating system unique to each user to select their favorite activities
- Remind users to replace 30 minutes of sedentary time with 30 minutes of activity, with the benefits increasing with higher intensity
- Remind users to reach the recommended 7,500 steps per day goal for significant health benefits
- **Marketing Bellabeat Ivy:**
 - Showcase popular activities utilizing Ivy as the perspective of the advertisement
 - Ivy as a fun avenue for sedentary women to fashionably adopt a more active lifestyle for longevity
 - Ivy as a game-changing tool for women to enhance current activities/find new activities to include in their routines

Ask

Business Task: Analyze FitBit device usage data tracking activity of thirty participants, find and propose opportunities of growth for one of Bellabeat's products or inform marketing strategy

Stakeholders: Urška Sršen, Sandro Mur, Marketing Analytics Team

Questions of Interest:

- What are some trends in smart device usage?
- How could these trends apply to Bellabeat customers?
- How could these trends help influence Bellabeat marketing strategy?

Prepare

Data Source: [Kaggle](#), generated by 30 Fitbit users through a distributed survey via Amazon Mechanical Turk during the dates 2016-04-12 through 2016-05-12

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Data Privacy: Personally identifying information has been left out, participant identification number as sole identifier

Data Integrity & Credibility:

- While the data is not current(from 2016), the information stored is complete and credible, with no null values and no inconsistencies or incorrect formatting
- Data is posted by user named Möbius on June 7, 2022, Möbius is verified through having been active for 7 years on Kaggle and completing multiple data analysis competitions on Kaggle ranking at 1460 out of 203,733
- Data originally does contain the minimal number sample size of 30 to represent the general population, 12 participants will be removed, so the results may not be fully representative of overall trends, but will give a glimpse into possible areas of improvement or interest

Dataset	Daily Activity ("dailyActivity_merged.csv")
Attributes (Focus of analysis)	<ul style="list-style-type: none"> - Id - ActivityDate - TotalSteps - TotalDistance - TrackerDistance - LoggedActivitiesDistance - VeryActiveDistance - ModeratelyActiveDistance - LightActiveDistance - SedentaryActiveDistance - VeryActiveMinutes - FairlyActiveMinutes - LightlyActiveMinutes - SedentaryMinutes - Calories

Relevance of Data Selected:

By comparing the total steps, varying levels of activity, and caloric expenditure across a specified period of time, the data will allow for understanding of user behavior such as overall activity intensity preferences, number of steps taken compared with sedentary time, and overall calories spent relative to activity intensity. These data comparisons will grant insight into ways that Bellabeat will be able to improve current product features and to better market its product to prospective buyers.

Process

Tools	Reasons for usage
Google Sheets	<ul style="list-style-type: none">- View and modify data with less than 1 million rows- No cost
Tableau Public	<ul style="list-style-type: none">- Intuitive and quick to build visualizations- Greater customization to uniquely create appealing visualizations- No cost
Google Colaboratory	<ul style="list-style-type: none">- Ease to share and elaborate on steps taken for coding- No cost

Data Cleaning:

Google Sheets

- Uploaded Daily Activity data set into Google Sheets
- Applied filters to look for null values/inconsistent values/incorrect formatting
- Found IDs which have 0 for total steps taken

Google Colaboratory

- Removed rows which do not have total steps data using Python(pandas) narrowing down the participant numbers to 18 from 30
- Exported data set as a .csv file

Tableau

- Uploaded the dataset to Tableau for visualization

Analyze

Data formatting included bolding, wrapping text, and freezing the first row for easier viewing. Through filtering the data, there were a few notable aspects of the data set. One trend observed includes a greater number of individuals which have lightly active minutes over very active minutes. Total daily steps attribute filtering shows that the numbers vary greatly ranging from 17 steps up to 36,019 steps. Also, total caloric expenditure per day ranges from 52 to 4547. Dates being analyzed will be limited to the month of April, as the data recorded for May is only partially complete.

Share

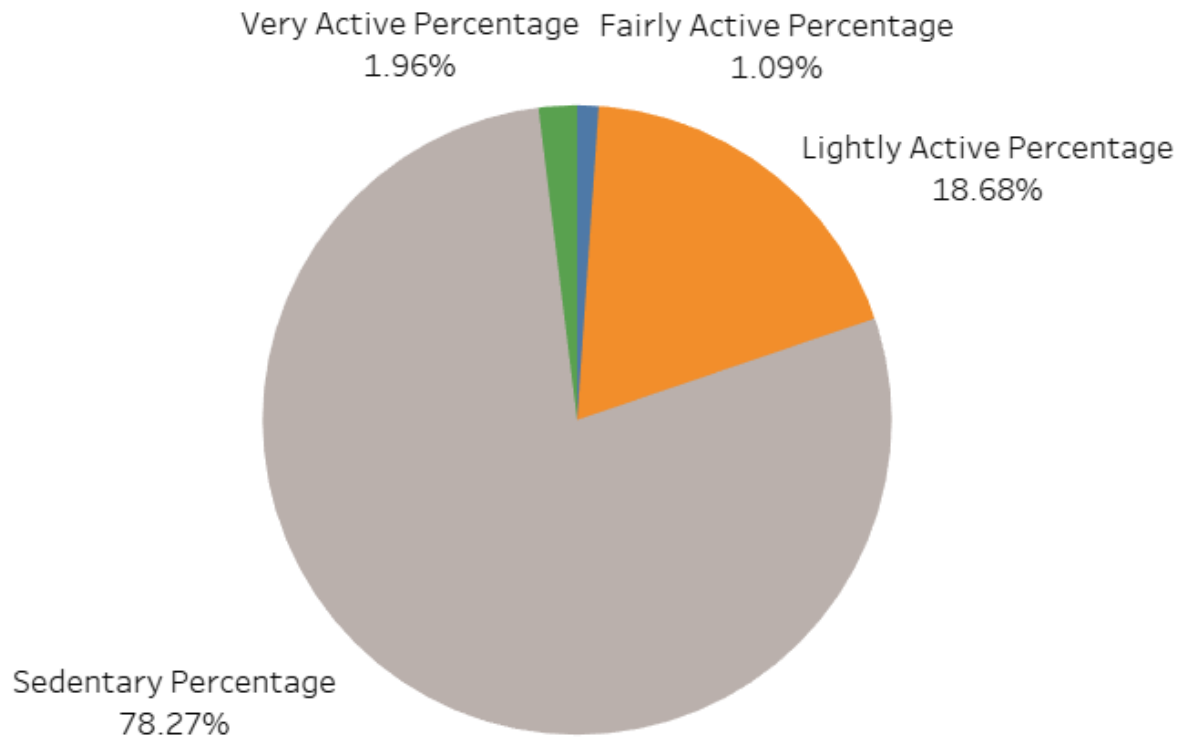
April 2016 Caloric Expenditure

Total caloric expenditure of 18 participants organized by total active minutes

Id	Calories	Lightly Active Minutes	Fairly Active Minutes	Very Active Minutes	Total Active Minutes(../
3372868164	37,425	6,386	82	183	6,651
8877689391	68,480	4,837	178	1,440	6,455
2873212765	36,889	5,871	120	295	6,286
2022484408	48,702	5,077	368	691	6,136
4558609924	39,160	5,599	277	177	6,053
6962181067	38,612	4,648	357	510	5,515
2347167796	36,782	4,545	370	243	5,158
8053475328	58,771	3,164	176	1,785	5,125
4388161847	58,454	4,320	344	321	4,985
3977333714	29,047	3,462	936	376	4,774
5553957443	36,220	3,922	251	481	4,654
8378563200	66,798	2,922	224	1,241	4,387
2026352035	28,581	4,325	8	3	4,336
4319703577	38,948	3,991	215	51	4,257
4445114986	41,649	4,012	8	86	4,106
2320127002	33,257	3,867	53	17	3,937
1644430081	54,252	3,292	456	171	3,919
1624580081	28,401	3,205	111	76	3,392

April 2016 Minutes Active

Varying intensities of minutes spent active out of total minutes active



April 2016 Daily Total Steps & Inactivity

Total steps of 18 participants compared with sedentary minutes



April 2016 Average Total Steps

Participant average total steps per day

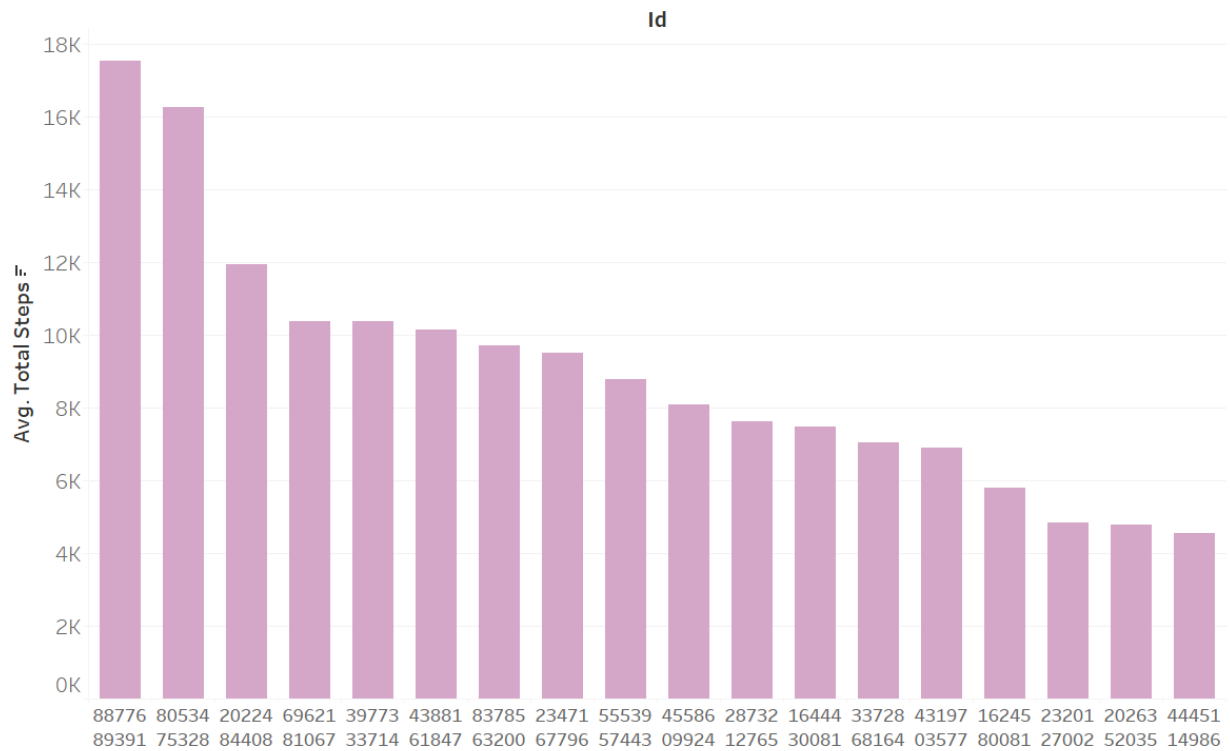


Tableau Public:

[Caloric Expenditure](#)

[Total Steps & Inactivity](#)

[Minutes Active](#)

[Average Total Steps](#)

Act

Caloric Expenditure Highlight Chart:

Insights:

- Most users do not prefer high intensity activity throughout the month
- More time spent active overall does not result in more calories burned
- More time spend with intense activity does result in higher calories burned

Recommendations:

- Find out what types of light activity users have a preference towards
- Discover ways that bellabeat Ivy can be used to track specific activity metrics in order for users to track their progress and improvements
- Market Bellabeat Ivy to future adopters using the most popular activities as the perspective of the advertisement
- Encourage users who are focused on weight loss to perform more intense activity over longer bouts of light/moderate activity

Minutes Active Pie Chart:

Insights:

- Users tend to spend less time performing moderate to intense activity throughout the month
- Light-intensity activity was preferred by the majority of participants

Recommendations:

- Implement a feature which allows users to discover new ways to stay active
- Provide tutorials or direct users to the proper resources to discover new activities
- Have a rating system per user to select their favorite activities to track
- Market Bellabeat Ivy as a tool for users to find exciting new ways/routines to stay active

Total Steps & Inactivity Scatterplot:

Insights:

- Users with the most steps also recorded a lot of time spent sedentary
- A significant relationship between sedentary minutes and total steps does not exist

Recommendations:

- Implement a feature which gives the user the option to schedule activity at optimal times of the day and get a friendly reminder to get active
- One [study](#) conducted in 2019 in the American Journal of Epidemiology showed:
 - Replacing 30 minutes of sedentary time with 30 minutes of either light-intensity physical activity(LIPA) was associated with a 17% lower mortality risk
 - Alternatively, replacing that same 30 minutes of sedentary time with moderate to vigorous physical activity(MVPA) was associated with a 35% lower mortality risk

- Market Bellabeat Ivy as a great way for sedentary individuals to adopt a more active lifestyle for longevity

Average Total Steps Bar Chart:

Insights:

- Participant steps per day average less than 10,000
- Eight out of eighteen participants averaged less than 8,000 steps per day

Recommendations:

- According to an [article](#) published by Harvard Medical School, 7,500 steps per day resulted in a 40% reduction in risk of death from a study conducted with 17,000 women with an average age of 72
- Implement a feature to encourage users to reach their daily step goals when they are below