Scenario

You are a junior data analyst working on the marketing analyst team at Bellabeat, a high-tech manufacturer of health-focused products for women. Bellabeat is a successful small company, but they have the potential to become a larger player in the global smart device market. Urška Sršen, co-founder and Chief Creative Officer of Bellabeat, believes that analyzing smart device fitness data could help unlock new growth opportunities for the company. You have been asked to focus on one of Bellabeat's products and analyze smart device data to gain insight into how consumers are using their smart devices. The insights you discover will then help guide marketing strategy for the company. You will present your analysis to the Bellabeat executive team along with your high-level recommendations for Bellabeat's marketing strategy.

Characters and products
● Characters
    ○ Urška Sršen: Bellabeat's co founder and Chief Creative Officer
    ○ Sando Mur: Mathematician and Bellabeat cofounder; key member of the Bellabeat executive team
    ○ Bellabeat marketing analytics team: A team of data analysts responsible for collecting, analyzing, and reporting data that helps guide Bellabeat's marketing strategy. You joined this team six months ago and have been busy learning about Bellabeat''s mission and business goals — as well as how you, as a junior data analyst, can help Bellabeat achieve them.

● Products
    ○ Bellabeat app: The Bellabeat app provides users with health data related to their activity, sleep, stress, menstrual cycle, and mindfulness habits. This data can help users better understand their current habits and make healthy decisions. The Bellabeat app connects to their line of smart wellness products.
    ○ Leaf: Bellabeat's classic wellness tracker can be worn as a bracelet, necklace, or clip. The Leaf tracker connects to the Bellabeat app to track activity, sleep, and stress.
    ○ Time: This wellness watch combines the timeless look of a classic timepiece with smart technology to track user activity, sleep, and stress. The Time watch connects to the Bellabeat app to provide you with insights into your daily wellness.
    ○ Spring: This is a water bottle that tracks daily water intake using smart technology to ensure that you are appropriately hydrated throughout the day. The Spring bottle connects to the Bellabeat app to track your hydration levels.
    ○ Bellabeat membership: Bellabeat also offers a subscription-based membership program for users. Membership gives users 24/7 access to fully personalized guidance on nutrition, activity, sleep, health and beauty, and mindfulness based on their lifestyle and goals**.**

About the company
Urška Sršen and Sando Mur founded Bellabeat, a high-tech company that manufactures health-focused smart products. Sršen used her background as an artist to develop beautifully designed technology that informs and inspires women around the world. Collecting data on

activity, sleep, stress, and reproductive health has allowed Bellabeat to empower women with knowledge about their own health and habits. Since it was founded in 2013, Bellabeat has grown rapidly and quickly positioned itself as a tech-driven wellness company for women.

By 2016, Bellabeat had opened offices around the world and launched multiple products. Bellabeat products became available through a growing number of online retailers in addition to their own e-commerce channel on their website. The company has invested in traditional advertising media, such as radio, out-of-home billboards, print, and television, but focuses on digital marketing extensively. Bellabeat invests year-round in Google Search, maintaining active Facebook and Instagram pages, and consistently engages consumers on Twitter. Additionally, Bellabeat runs video ads on Youtube and display ads on the Google Display Network to support campaigns around key marketing dates.

Sršen knows that an analysis of Bellabeat's available consumer data would reveal more opportunities for growth. She has asked the marketing analytics team to focus on a Bellabeat product and analyze smart device usage data in order to gain insight into how people are already using their smart devices. Then, using this information, she would like high-level recommendations for how these trends can inform Bellabeat marketing strategy.

Ask

Business Task:
Bellabeat wants to study the trends associated with smart devices to better create, utilize, optimize, and maintain their products as well as gain a better understanding of the smart device using-habits of its users and smart device users as a whole so that their products can be used most efficiently and effectively.

Key Stakeholders:
- Urška Sršen: Bellabeat's founder and Chief Creative Officer
- Sando Mur: Bellabeat's co-founder; mathematician; and key member of the Bellabeat executive team
- Bellabeats executive team: Responsible for making business decisions based on the information given to them

Prepare Data:
The data is surveyed from 30 Fitbit users on daily activity, calories, sleep, weight loss, and intensities of activity. The data, which is 3rd party data from Amazon Mechanical Turk, is stored on Kaggle from the user Morbius. The data is public for others to use, and it is highly cited.

Some limitations to the data is that it uses a small sample size of 30 fitbit users in a span of about 2 months, which is considered a small amount. The data also doesn't give info about the

users gender, which could create issues as Bellabeat focuses on women's health, and the data also doesn't look at reproductive health.

Reliability: The data is somewhat reliable, using real sample data from 30 fitbit users.

Originality: The data is 3rd party data, surveyed through Amazon Mechanical Turk.

Comprehensive: The data has information in multiple aspects of fitbit usage, including activity, sleep, calories & weight loss.

Current: The data is over 6 years old, surveyed between march and may of 2016. It is still relevant despite its age.

Cited: the data is cited.

The most relevant data to use would include sleep, calories and activity data, so the particular spreadsheets used are the following:

dailyActivity_merged
dailyCalories_merged
dailyIntensities_merged
dailySteps_merged
sleepDay_merged

Google Sheets & SQL will primarily be used to process this data.

Processing Data
Using Google Sheets, the data sheets were uploaded and cleaned for data processing. This involved sorting data by date in ascending order as well as changing the format types for the dates to the "date" format. Doing this made uploading the sheets into BigQuery much easier.

The numeric data was also formatted to 4 decimal places for distance data and whole numbers for any data reflecting time. This makes the data more clean and consistent.

Once the sheets were cleaned, they were saved to a new folder and uploaded to Bigquery for analysis.

Using SQL, a function to count the unique IDs was run to show any inconsistencies in the data. The syntax is as follows:

```
SELECT count(DISTINCT Id)
FROM `case-study-bellabeat-367218.Fitbit_Data.daily_activity`
```

This yielded 33 unique IDs

```sql
SELECT count(DISTINCT Id)
FROM `case-study-bellabeat-367218.Fitbit_Data.daily_calories`
```

This yielded 33 unique IDs

```sql
SELECT count(DISTINCT Id)
FROM `case-study-bellabeat-367218.Fitbit_Data.daily_intensities`
```

This yielded 33 unique IDs

```sql
SELECT count(DISTINCT Id)
FROM `case-study-bellabeat-367218.Fitbit_Data.daily_steps'
```

This yielded 33 unique IDs

```sql
SELECT count(DISTINCT Id)
FROM `case-study-bellabeat-367218.Fitbit_Data.sleep_day`
```

This yielded 24 unique IDs

As seen above, the data shows inconsistencies with the number of users for each of the surveys taken with the largest inconsistency being in the sleep_day table.

In addition to the unique IDs, SQL was used to count the distinct number of days that activity was tracked for each of the users. Results shown below:

```sql
SELECT count(DISTINCT ActivityDate)
FROM `case-study-bellabeat-367218.Fitbit_Data.daily_activity`
```

This yielded 31 unique dates

```sql
SELECT count(DISTINCT ActivityDay)
FROM `case-study-bellabeat-367218.Fitbit_Data.daily_calories`
```

This yielded 31 unique dates

```sql
SELECT count(DISTINCT ActivityDay)
FROM `case-study-bellabeat-367218.Fitbit_Data.daily_intensities`
```

This yielded 31 unique dates

```sql
SELECT count(DISTINCT ActivityDay)
FROM `case-study-bellabeat-367218.Fitbit_Data.daily_steps`
```

This yielded 31 unique dates

```sql
SELECT count(DISTINCT Sleep_Date)
FROM `case-study-bellabeat-367218.Fitbit_Data.sleep_day`
```

This yielded 31 unique dates

All 5 tables yielded 31 unique dates that the users recorded. This shows a much smaller sample size than what the survey had said. Instead of around 2 months between March 12 and May 12th, it was really only around 1 month of activity that was recorded. This will give less accurate results overall.

Bellabeat is a company focusing on health and wellbeing specifically studying sleep, activity and stress. the data measures sleep, activity, and calories which will be used to analyze the following questions:

What is the average amount of sleep users gain in correlation with the amount of activity they recorded?

Sleep Statistics
Max time asleep: 796
Min time Asleep: 58
Average Sleep Time: 419.467

Activity Statistics
Max Total Steps: 36019
Min Total Steps:0
Average Total Steps: 7637.910

For this, we used the following query:

```sql
select TotalDistance, TotalSteps, TotalMinutesAsleep
FROM `case-study-bellabeat-367218.Fitbit_Data.daily_activity` AS daily_activity
JOIN `case-study-bellabeat-367218.Fitbit_Data.sleep_day` AS daily_sleep
ON daily_activity.Id=daily_activity.Id
```

By running this query, we find that generally, a higher amount of activity in total steps correlates to higher amounts of sleep. Although this does not equal causation, there is a relationship between activity and sleep.

How are calories burned related to the intensity of activity of users?

Max Calories: 4900
Min Calories: 52
Average Calories: 2,303.610

```sql
select SedentaryMinutes, LightlyActiveMinutes, FairlyActiveMinutes, VeryActiveMinutes,
Calories
FROM `case-study-bellabeat-367218.Fitbit_Data.daily_intensities` AS daily_intensities
JOIN `case-study-bellabeat-367218.Fitbit_Data.daily_calories` AS daily_calories
ON daily_intensities.Id=daily_calories.Id
ORDER BY VeryActiveMinutes DESC
```

Similar to the first question, we see that generally, more intense workouts correlate to higher amounts of calories burned. It important to note that the highest amount of calories were burned with the highest amount of minutes in the VeryActiveMinutes column.

How many steps are users getting throughout the day?

Avg number of steps: 7,637.910
Max number of steps: 36019
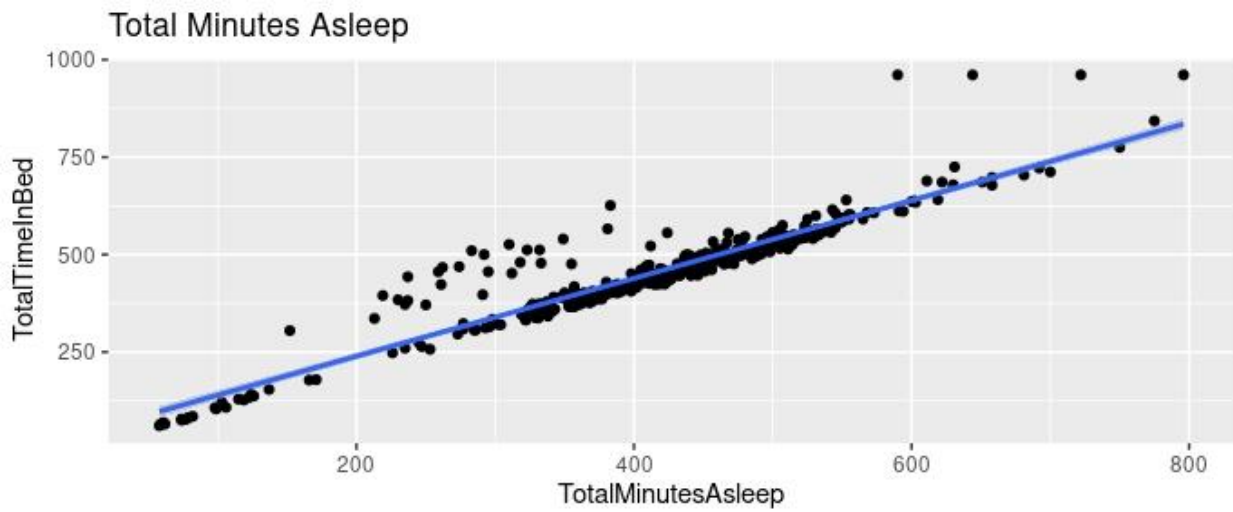Min Number of steps: 4

In addition to those, 863 records out of 940 had a step count of over 0, showing that not every user was wearing their devices during the period of the survey.

Answering the questions will give Bellabeat a better understanding of how the data will help them record sleep and activity data for their clients. It can also allow them to use the analysis to create products
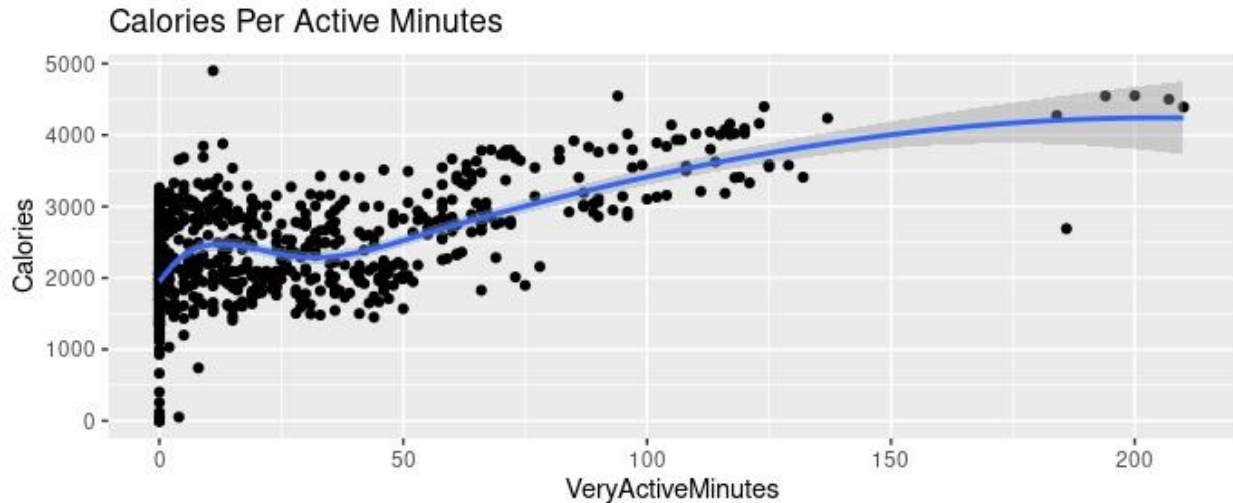
Share:
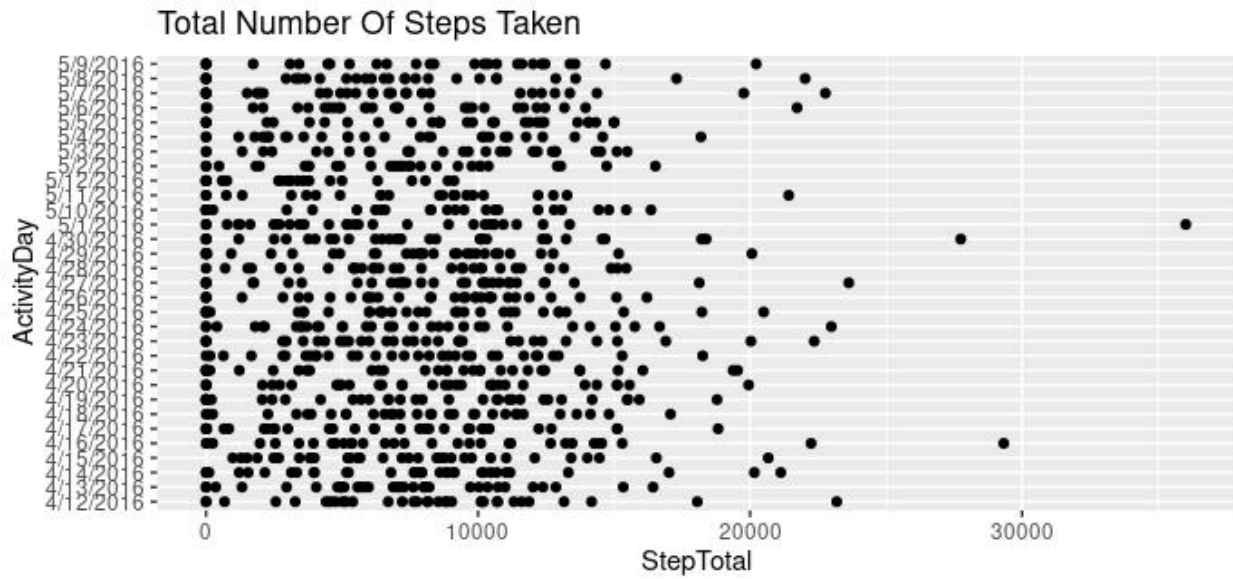
The total activity per day as compared to total steps displayed as a scatterplot.

The number of minutes spent in bed compared to total minutes asleep displayed as a scatterplot.

The number of Calories burned over Active Minutes displayed as a scatterplot.

The graphics show the snapshots of steps taken, activity, sleep, and calories burned. They indicate a positive relationship between activity and calories burned, as well as the total number of steps and total time asleep. These are important to help Bellabeat better understand the data and the questions it is trying to answer.

Act:
Bellabeat has a great opportunity to optimize and utilize their smart devices so that they can be used most efficiently by their users. They can also focus on their core belief being the health of their users and more importantly women. Based on the data analysis, they can do this with the following insights:

1. Bellabeat should track the relationship between sleep and activity. This allows Bellabeat to gain better insights into the sleep patterns of their users. With that information they can help their users who may have sleep issues. Their smart devices can be used to log sleep hours and give their users pop ups on their sleep activity

2. Bellabeat can measure more in depth calorie burning based on amount of activity. Although many smart devices can track calorie burning and activity, Bellabeat has the chance to really delve into this. They can use their app and smart device to track the number of calories the user eats as long as the activity of the user. They can then make recommendations for their user based on their health goals.

3. Bellabeats smart devices and apps can motivate its users to take the recommended number of steps on a daily basis. They can do this with pop ups but also they can create fitness schedules and goals for its users in order to get the steps.

Conclusion:
Bellabeat has a great opportunity to distinguish itself from its competitors and make their products the premier choice on the market. But more importantly, they can focus on their users' individual needs and goals by utilizing data.