

# Coursera Fitabase Data Case Study

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## Explanation

The goal of this case study for the Google Analytics Certificate is to analyze the provided smart fitness data to provide insight into trends and potential opportunities with Bellabeat's current products in mind.

## Documentation

Documentation of Data <https://www.fitabase.com/media/1930/fitabasedatadictionary102320.pdf> Distance in Kilometers Calories is Calories burned

#Data Import & Prep

*#Get Dataframes*

```
sleepDay = myfiles$sleepDay_merged.csv
dailyActivity = myfiles$dailyActivity_merged.csv
dailyIntensities = myfiles$dailyIntensities_merged.csv
dailySteps = myfiles$dailySteps_merged.csv
dailyCalories = myfiles$dailyCalories_merged.csv
hourlyCalories = myfiles$hourlyCalories_merged.csv
hourlyIntensities = myfiles$hourlyIntensities_merged.csv
weightLog = myfiles$weightLogInfo_merged.csv
```

#Data Examination

*#Skim Data for key observations & potential flaws*

```
sleepDay %>%
  select(TotalSleepRecords,
         TotalMinutesAsleep,
         TotalTimeInBed
  ) %>%
  skim_without_charts()
```

Table 1: Data summary

Name	Piped data
Number of rows	413

Table 1: Data summary

Number of columns	3
Column type frequency: numeric	3
Group variables	None

**Variable type: numeric**

skim_variable	n_missing	complete_rate	mean	sd	p0	p25	p50	p75	p100
TotalSleepRecords	0	1	1.12	0.35	1	1	1	1	3
TotalMinutesAsleep	0	1	419.47	118.34	58	361	433	490	796
TotalTimeInBed	0	1	458.64	127.10	61	403	463	526	961

*#Mean 419 Min Asleep, 39.2 Mean Extra Minutes in Bed*  
*#Standard Deviations seem high, ~68% of people take ~86 minutes to go to bed?*  
*#Might be counting time after waking and still lying in bed?*

```
dailyActivity %>%
  select(
    TotalDistance,
    TotalSteps,
    Calories,
    TrackerDistance,
    LoggedActivitiesDistance,
    SedentaryActiveDistance,
    SedentaryMinutes,
    LightActiveDistance,
    LightlyActiveMinutes,
    ModeratelyActiveDistance,
    FairlyActiveMinutes,
    VeryActiveDistance,
    VeryActiveMinutes
  ) %>%
  skim_without_charts()
```

Table 3: Data summary

Name	Piped data
Number of rows	940
Number of columns	13
Column type frequency: numeric	13
Group variables	None

**Variable type: numeric**

skim_variable	n_missing	complete_rate	mean	sd	p0	p25	p50	p75	p100
TotalDistance	0	1	5.49	3.92	0	2.62	5.24	7.71	28.03
TotalSteps	0	1	7637.91	5087.15	0	3789.75	7405.50	10727.00	36019.00
Calories	0	1	2303.61	718.17	0	1828.50	2134.00	2793.25	4900.00
TrackerDistance	0	1	5.48	3.91	0	2.62	5.24	7.71	28.03
LoggedActivitiesDistance	0	1	0.11	0.62	0	0.00	0.00	0.00	4.94
SedentaryActiveDistance	0	1	0.00	0.01	0	0.00	0.00	0.00	0.11
SedentaryMinutes	0	1	991.21	301.27	0	729.75	1057.50	1229.50	1440.00
LightActiveDistance	0	1	3.34	2.04	0	1.95	3.36	4.78	10.71
LightlyActiveMinutes	0	1	192.81	109.17	0	127.00	199.00	264.00	518.00
ModeratelyActiveDistance	0	1	0.57	0.88	0	0.00	0.24	0.80	6.48
FairlyActiveMinutes	0	1	13.56	19.99	0	0.00	6.00	19.00	143.00
VeryActiveDistance	0	1	1.50	2.66	0	0.00	0.21	2.05	21.92
VeryActiveMinutes	0	1	21.16	32.84	0	0.00	4.00	32.00	210.00

*#5.49 Units Mean Total Distance, 7638 Mean Steps, 2304 Mean Calories...*

```
dailyIntensities %>%
  select(
    SedentaryMinutes,
    LightlyActiveMinutes,
    FairlyActiveMinutes,
    VeryActiveMinutes,
    SedentaryActiveDistance,
    LightActiveDistance,
    ModeratelyActiveDistance,
    VeryActiveDistance
  ) %>%
  skim_without_charts()
```

Table 5: Data summary

Name	Piped data
Number of rows	940
Number of columns	8
Column type frequency:	
numeric	8
Group variables	None

**Variable type: numeric**

skim_variable	n_missing	complete_rate	mean	sd	p0	p25	p50	p75	p100
SedentaryMinutes	0	1	991.21	301.27	0	729.75	1057.50	1229.50	1440.00
LightlyActiveMinutes	0	1	192.81	109.17	0	127.00	199.00	264.00	518.00
FairlyActiveMinutes	0	1	13.56	19.99	0	0.00	6.00	19.00	143.00
VeryActiveMinutes	0	1	21.16	32.84	0	0.00	4.00	32.00	210.00

skim_variable	n_missing	complete_rate	mean	sd	p0	p25	p50	p75	p100
SedentaryActiveDistance	0	1	0.00	0.01	0	0.00	0.00	0.00	0.11
LightActiveDistance	0	1	3.34	2.04	0	1.95	3.36	4.78	10.71
ModeratelyActiveDistance	0	1	0.57	0.88	0	0.00	0.24	0.80	6.48
VeryActiveDistance	0	1	1.50	2.66	0	0.00	0.21	2.05	21.92

*#193 mean lightly active minutes, 32 fairly active mean minutes*

```
dailySteps %>%
  select(
    StepTotal
  ) %>%
  skim_without_charts()
```

Table 7: Data summary

Name	Piped data
Number of rows	940
Number of columns	1
Column type frequency: numeric	1
Group variables	None

**Variable type: numeric**

skim_variable	n_missing	complete_rate	mean	sd	p0	p25	p50	p75	p100
StepTotal	0	1	7637.91	5087.15	0	3789.75	7405.5	10727	36019

```
dailyCalories %>%
  select(
    Calories
  ) %>%
  skim_without_charts()
```

Table 9: Data summary

Name	Piped data
Number of rows	940
Number of columns	1
Column type frequency: numeric	1
Group variables	None

**Variable type: numeric**

skim_variable	n_missing	complete_rate	mean	sd	p0	p25	p50	p75	p100
Calories	0	1	2303.61	718.17	0	1828.5	2134	2793.25	4900

```
#Separate Datetime to Date and Time
```

```
#Date Time - Posix*
```

```
sleepDay$Date_Time_Cleaned = strptime(sleepDay$SleepDay,"%m/%d/%Y %I:%M:%S %p",tz="UTC")
hourlyCalories$Date_Time_Cleaned = strptime(hourlyCalories$ActivityHour,"%m/%d/%Y %I:%M:%S %p",tz="UTC")
hourlyIntensities$Date_Time_Cleaned = strptime(hourlyIntensities$ActivityHour,"%m/%d/%Y %I:%M:%S %p",tz="UTC")
weightLog$Date_Time_Cleaned = strptime(weightLog$Date,"%m/%d/%Y %I:%M:%S %p",tz="UTC")
```

```
#Date Only - Posix*
```

```
sleepDay$Date_Cleaned = strptime(sleepDay$SleepDay,"%m/%d/%Y")
hourlyCalories$Date_Cleaned = strptime(hourlyCalories$ActivityHour,"%m/%d/%Y")
hourlyIntensities$Date_Cleaned = strptime(hourlyIntensities$ActivityHour,"%m/%d/%Y")
weightLog$Date_Cleaned = strptime(weightLog$Date,"%m/%d/%Y")
```

```
dailyActivity$Date_Cleaned = strptime(dailyActivity$ActivityDate,"%m/%d/%Y")
dailyIntensities$Date_Cleaned = strptime(dailyIntensities$ActivityDay,"%m/%d/%Y")
dailySteps$Date_Cleaned = strptime(dailySteps$ActivityDay,"%m/%d/%Y")
dailyCalories$Date_Cleaned = strptime(dailyCalories$ActivityDay,"%m/%d/%Y")
```

```
#Time Only - Characters
```

```
sleepDay$Time_Cleaned = strptime(sleepDay$Date_Time_Cleaned,"%H:%M:%S")
hourlyCalories$Time_Cleaned = strptime(hourlyCalories$Date_Time_Cleaned,"%H:%M:%S")
hourlyIntensities$Time_Cleaned = strptime(hourlyIntensities$Date_Time_Cleaned,"%H:%M:%S")
weightLog$Time_Cleaned = strptime(weightLog$Date_Time_Cleaned,"%H:%M:%S")
```

```
#Joins/Merge
```

```
#Activity and Sleep
```

```
Activity_Day_Sleep_Day = left_join(dailyActivity,sleepDay,by=c("Id","Date_Cleaned"))
```

```
#Adding Columns for Analysis
```

```
#Time Awake in Bed
```

```
Activity_Day_Sleep_Day$SleepLatency = Activity_Day_Sleep_Day$TotalTimeInBed - Activity_Day_Sleep_Day$TotalTimeAsleep
```

```
#Conversion Integer to Numeric - For Correlations
```

```
Activity_Day_Sleep_Day[c(3,4,5,6,7,8,9,10,11,12,13,14,15,19,20,23)] = sapply(Activity_Day_Sleep_Day[c(3,4,5,6,7,8,9,10,11,12,13,14,15,19,20,23)],as.numeric)
```

```
# Examining & Graphing Variables
```

```
#Sleep Variable
```

```
Activity_Day_Sleep_Day %>%
  select(TotalSleepRecords,
         TotalMinutesAsleep,
         TotalTimeInBed,
```

```

SleepLatency
) %>%
skim_without_charts()

```

Table 11: Data summary

Name	Piped data
Number of rows	943
Number of columns	4
Column type frequency: numeric	4
Group variables	None

#### Variable type: numeric

skim_variable	n_missing	complete_rate	mean	sd	p0	p25	p50	p75	p100
TotalSleepRecords	530	0.44	1.12	0.35	1	1	1	1	3
TotalMinutesAsleep	530	0.44	419.47	118.34	58	361	433	490	796
TotalTimeInBed	530	0.44	458.64	127.10	61	403	463	526	961
SleepLatency	530	0.44	39.17	46.57	0	17	25	40	371

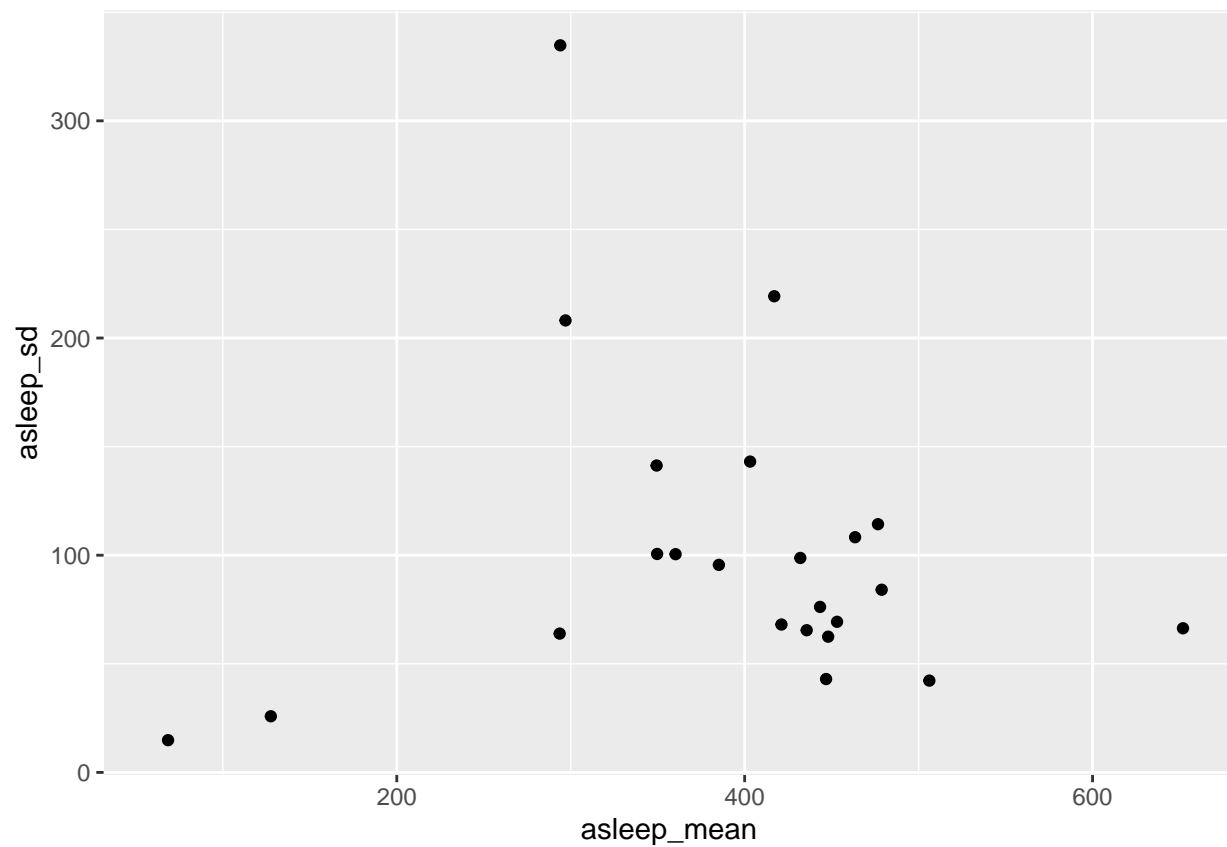
*#Individual Means and Deviations - Some Notable Outliers*  
*#Some IDs have no SD - Because only one observed sleep data.*  
*#Notably, two individuals had substantially higher awake means,*  
*#2 others had substantially higher awake standard deviations*

```

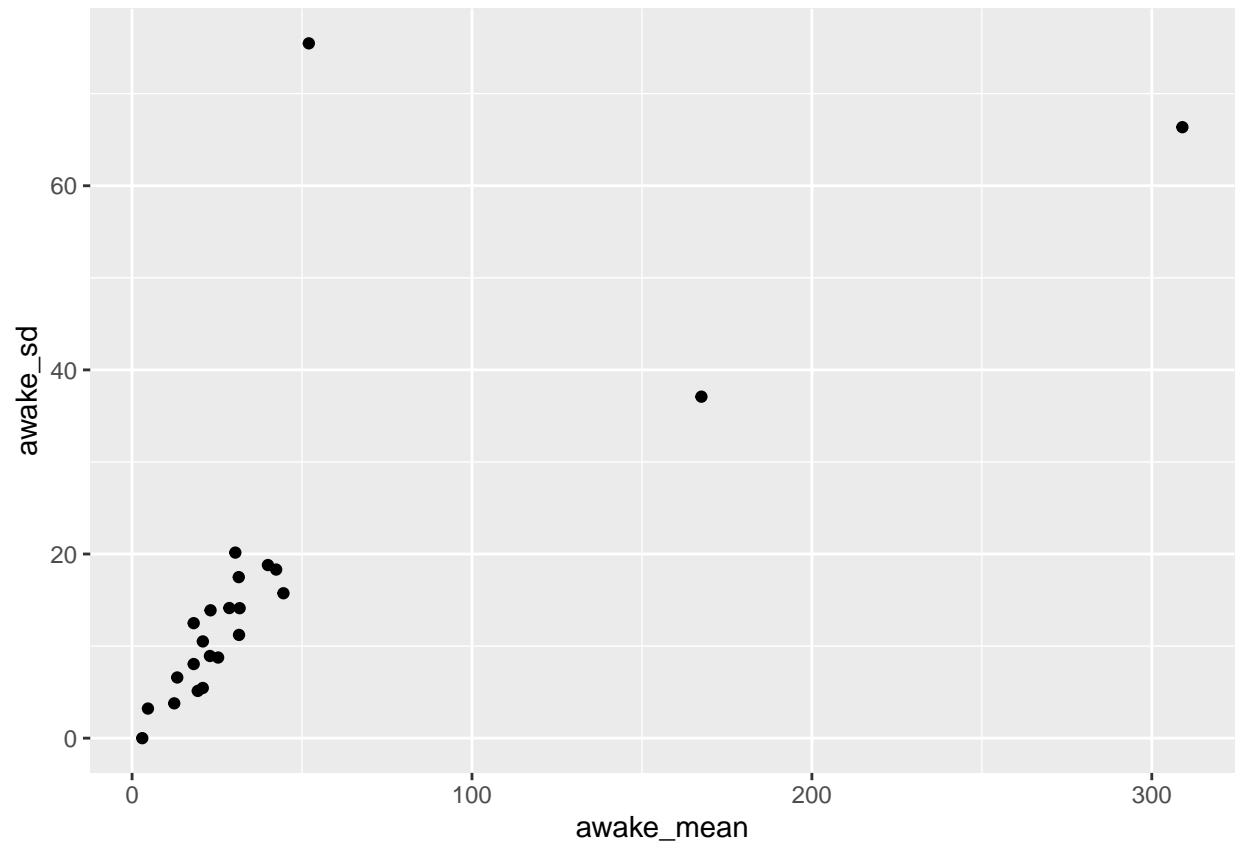
Sleep_Awake_Mean_SD =
  Activity_Day_Sleep_Day %>%
  group_by(Id) %>%
  drop_na() %>%
  mutate(awake_mean=mean(SleepLatency,na.rm=TRUE),
         awake_sd = sd(SleepLatency,na.rm=TRUE),
         asleep_mean=mean(TotalMinutesAsleep,na.rm=TRUE),
         asleep_sd = sd(TotalMinutesAsleep,TRUE),
         .keep="used") %>%
  filter(!duplicated(Id))

```

*#Visualization of Outliers around cluster of more normal means and deviations*  
 ggplot(Sleep\_Awake\_Mean\_SD,aes(x=asleep\_mean,y=asleep\_sd)) + geom\_point()



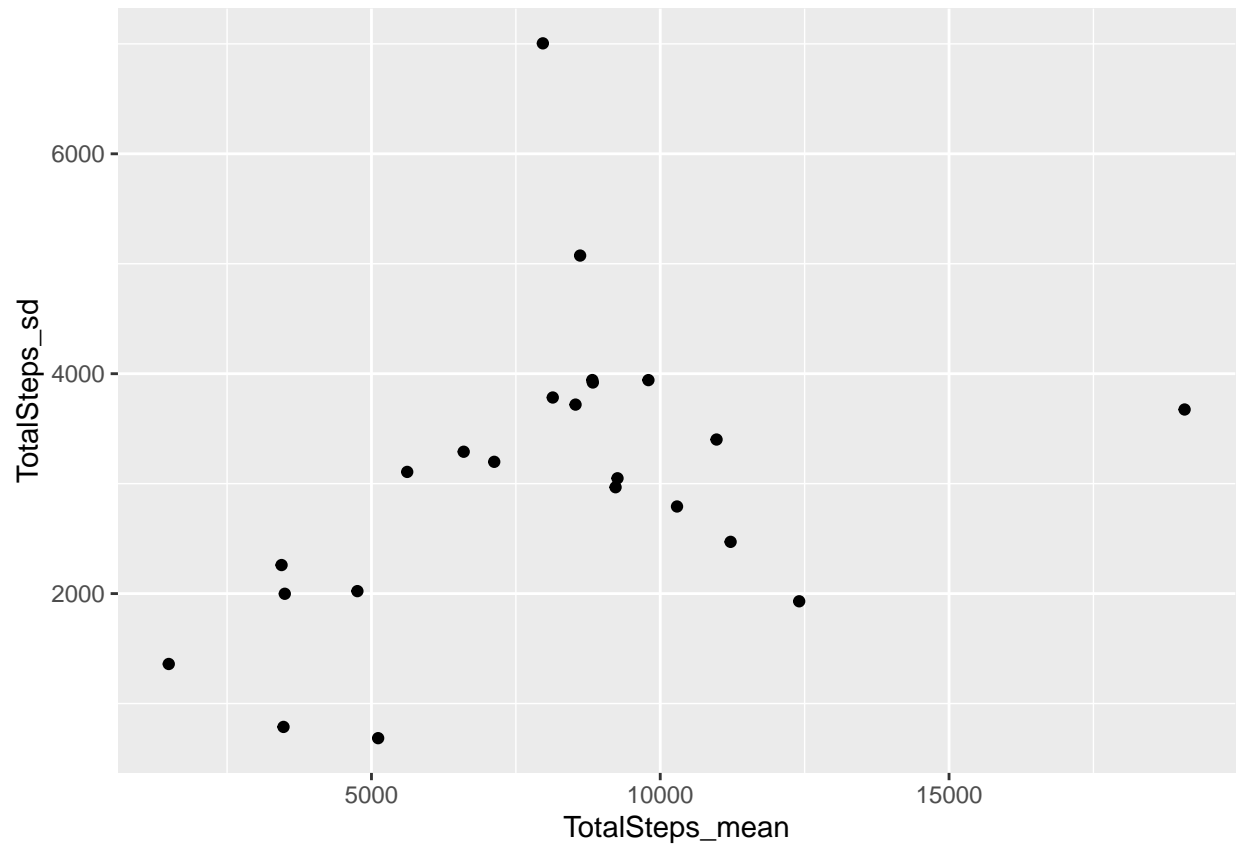
```
ggplot(Sleep_Awake_Mean_SD,aes(x=awake_mean,y=awake_sd)) + geom_point()
```



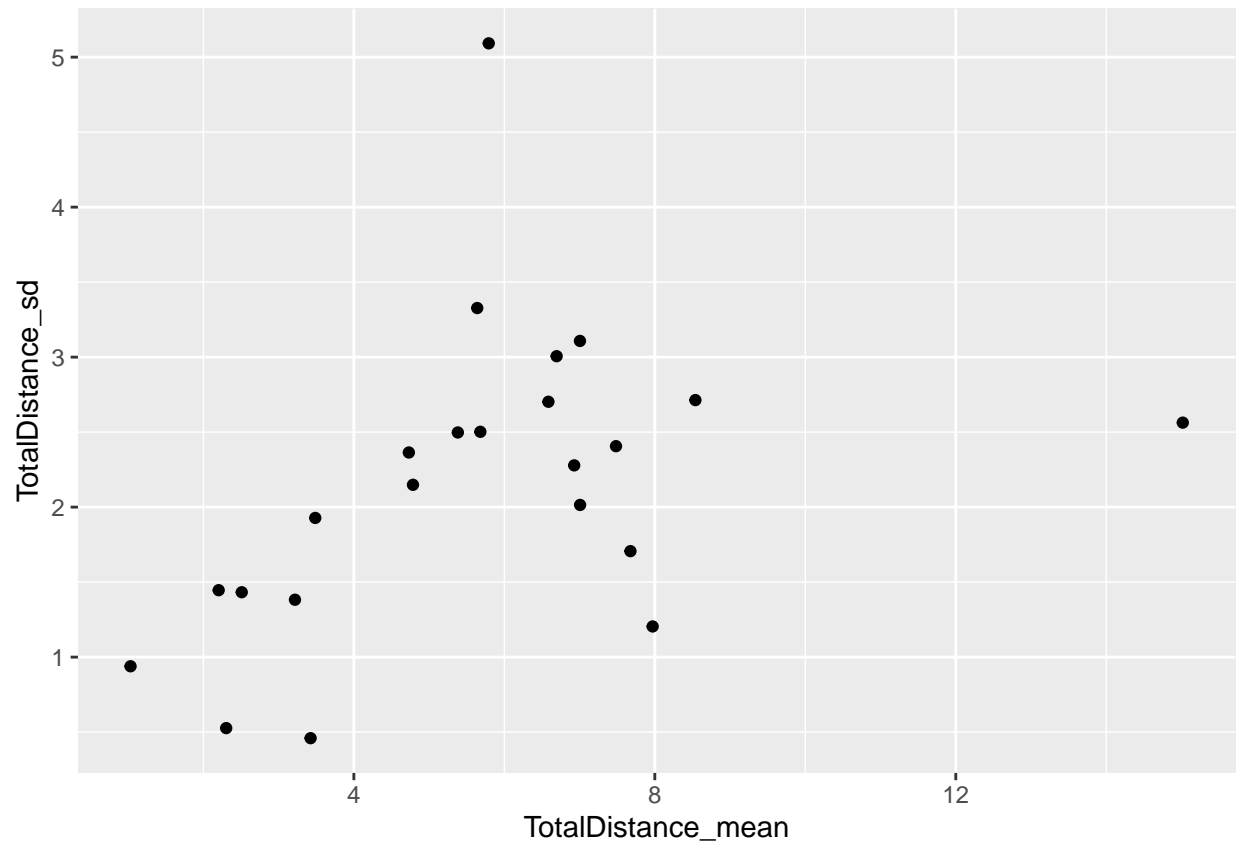
```
#Exercise/Activity Variable
Exercise_Sedentary_Mean_SD =
  Activity_Day_Sleep_Day %>%
  group_by(Id) %>%
  drop_na() %>%
  mutate(TotalSteps_mean=mean(TotalSteps,na.rm=TRUE),
         TotalSteps_sd = sd(TotalSteps,na.rm=TRUE),
         TotalDistance_mean=mean(TotalDistance,na.rm=TRUE),
         TotalDistance_sd = sd(TotalDistance,TRUE),
         Calories_mean=mean(Calories,na.rm=TRUE),
         Calories_sd = sd(Calories,na.rm=TRUE),
         SedentaryMinutes_mean=mean(SedentaryMinutes,na.rm=TRUE),
         SedentaryMinutes_sd = sd(SedentaryMinutes,TRUE),
         .keep="used") %>%
  filter(!duplicated(Id))

ggplot(Exercise_Sedentary_Mean_SD,aes(x=TotalSteps_mean,y=TotalSteps_sd)) + geom_point()
```

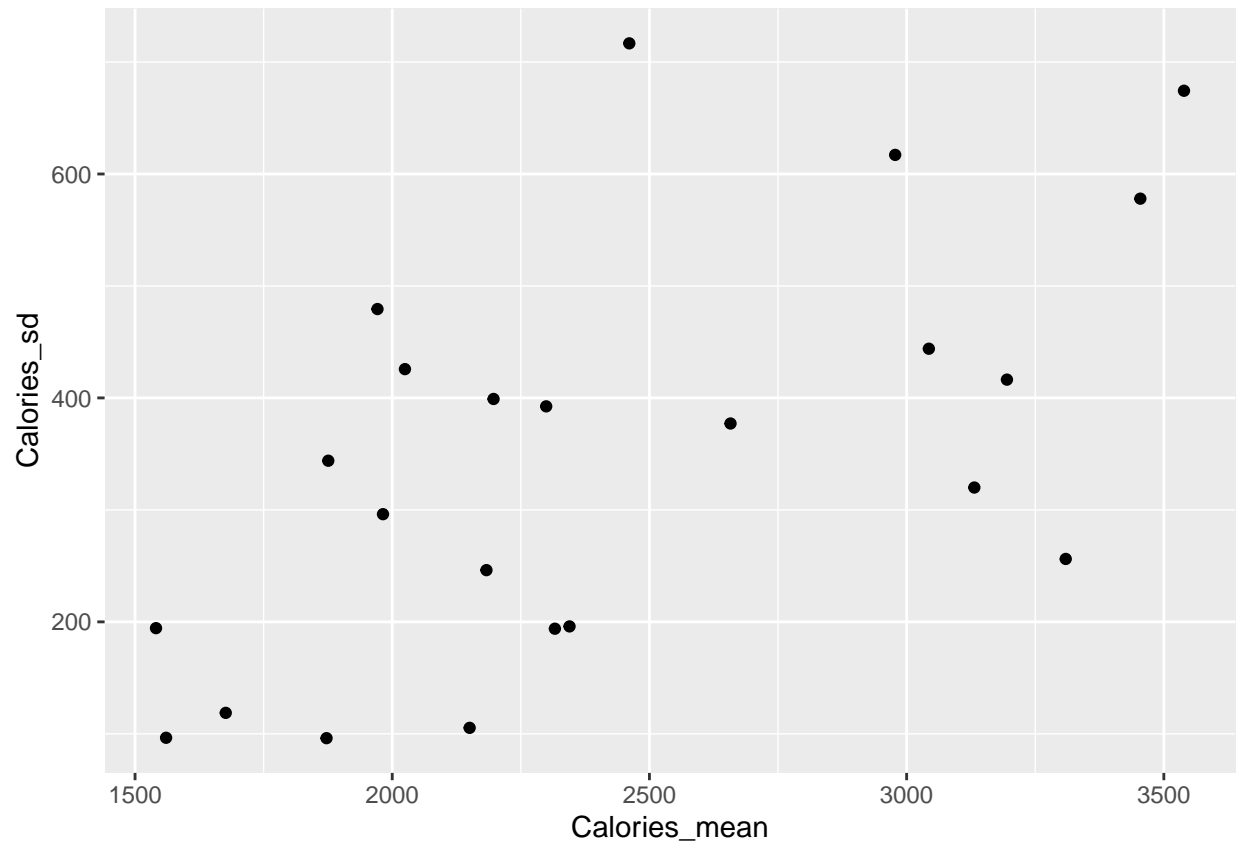




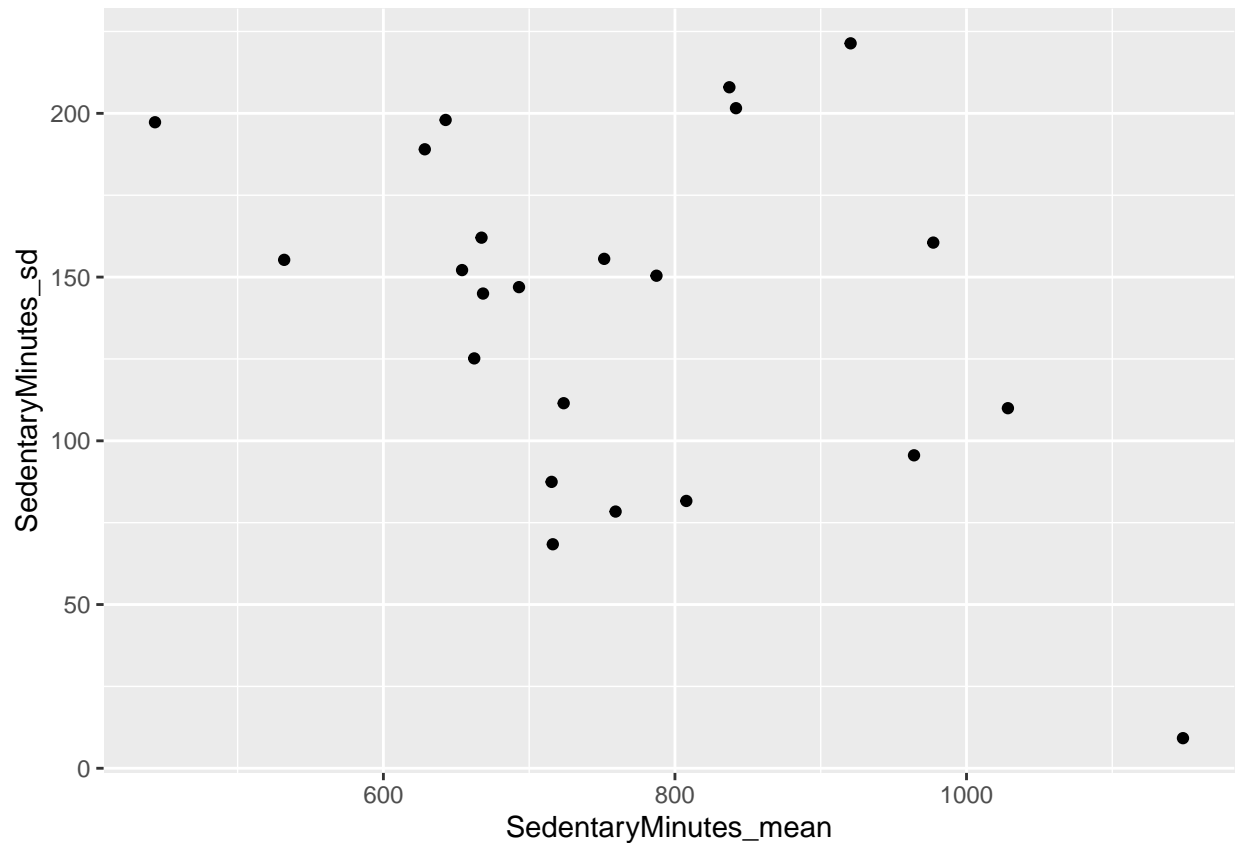
```
ggplot(Exercise_Sedentary_Mean_SD,aes(x=TotalDistance_mean,y=TotalDistance_sd)) + geom_point()
```



```
ggplot(Exercise_Sedentary_Mean_SD,aes(x=Calories_mean,y=Calories_sd)) + geom_point()
```



```
ggplot(Exercise_Sedentary_Mean_SD,aes(x=SedentaryMinutes_mean,y=SedentaryMinutes_sd)) + geom_point()
```



```
#Minutes - VeryActiveMinutes, FairlyActiveMinutes,LightlyActiveMinutes,SedentaryMinutes
```

```
Exercise_Minutes_Mean_SD =
```

```
  Activity_Day_Sleep_Day %>%
```

```
  group_by(Id) %>%
```

```
  drop_na() %>%
```

```
  mutate(VeryActiveMinutes_mean=mean(VeryActiveMinutes,na.rm=TRUE),
```

```
         VeryActiveMinutes_sd = sd(VeryActiveMinutes,na.rm=TRUE),
```

```
         FairlyActiveMinutes_mean=mean(FairlyActiveMinutes,na.rm=TRUE),
```

```
         FairlyActiveMinutes_sd = sd(FairlyActiveMinutes,TRUE),
```

```
         LightlyActiveMinutes_mean=mean(LightlyActiveMinutes,na.rm=TRUE),
```

```
         LightlyActiveMinutes_sd = sd(LightlyActiveMinutes,na.rm=TRUE),
```

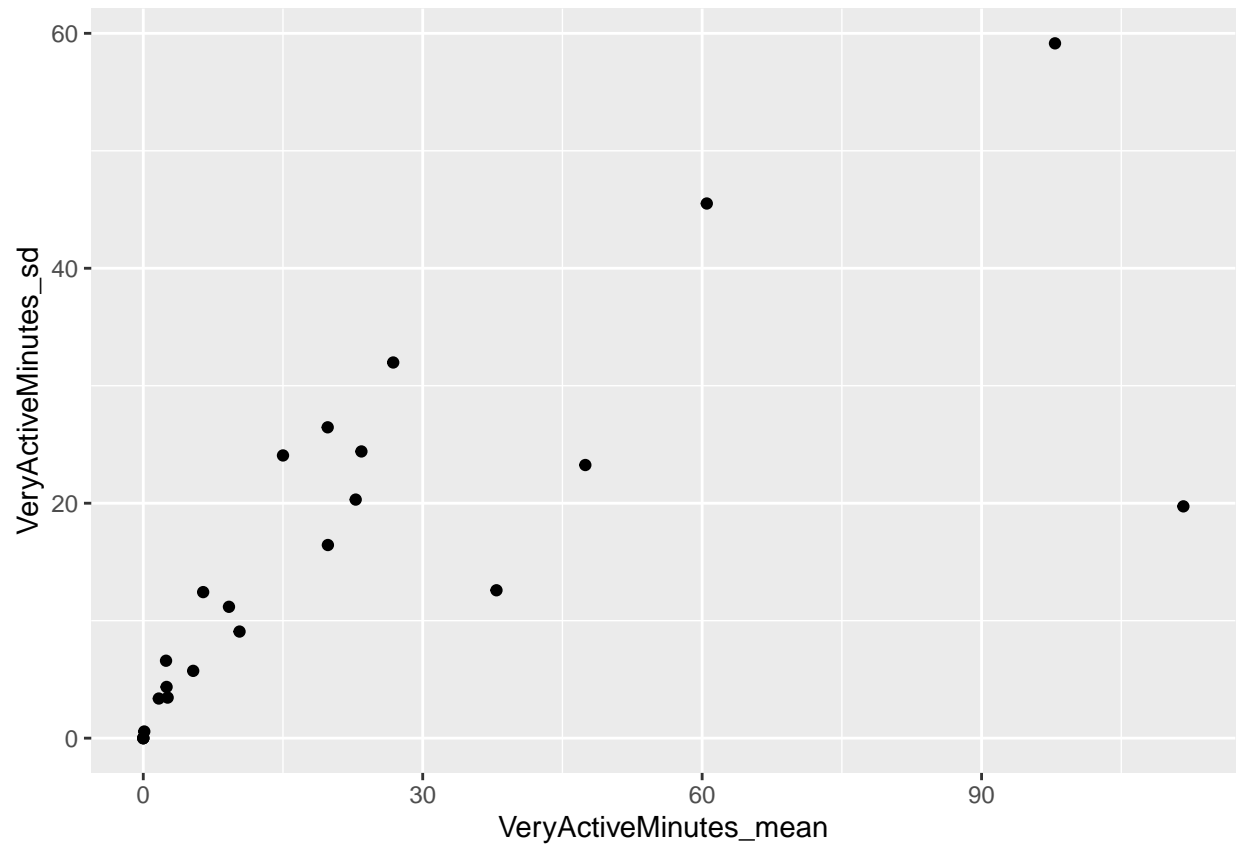
```
         SedentaryMinutes_mean=mean(SedentaryMinutes,na.rm=TRUE),
```

```
         SedentaryMinutes_sd = sd(SedentaryMinutes,TRUE),
```

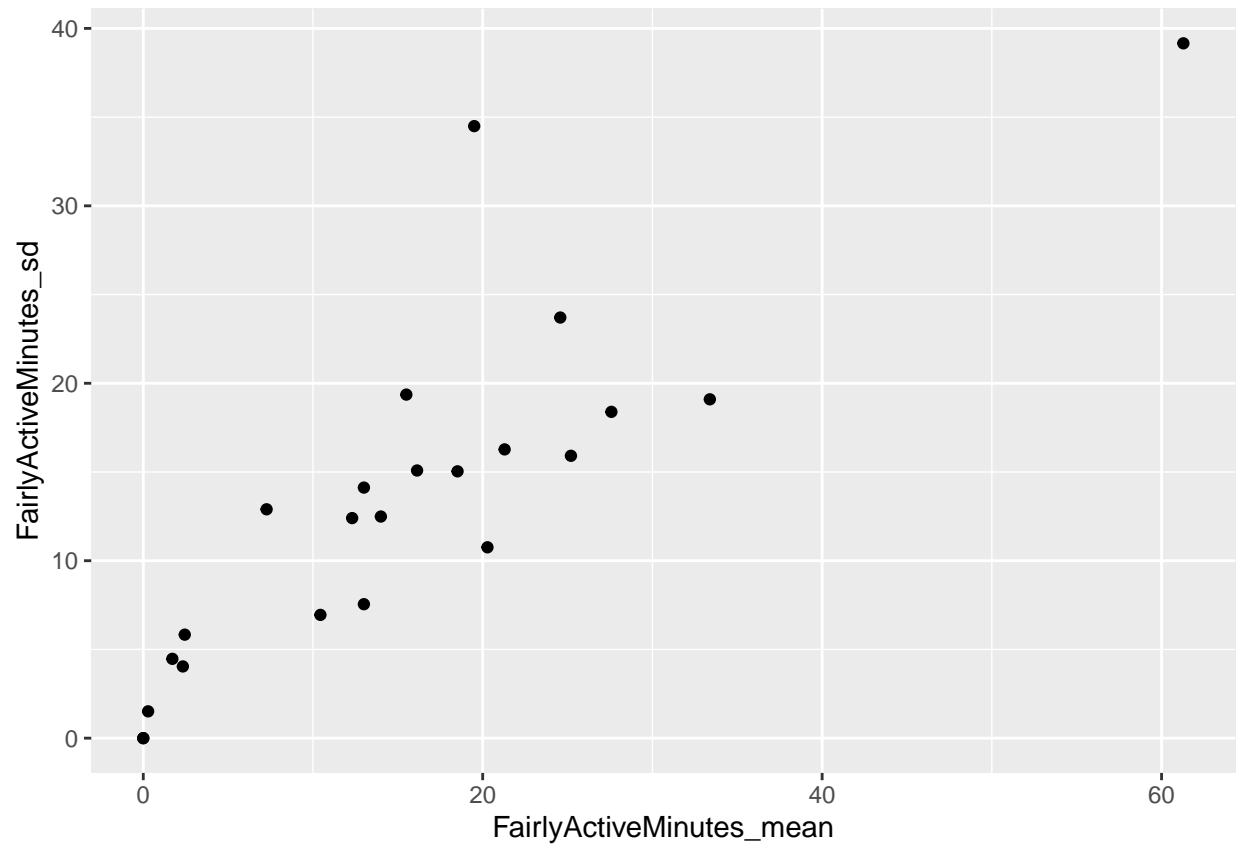
```
         .keep="used") %>%
```

```
  filter(!duplicated(Id))
```

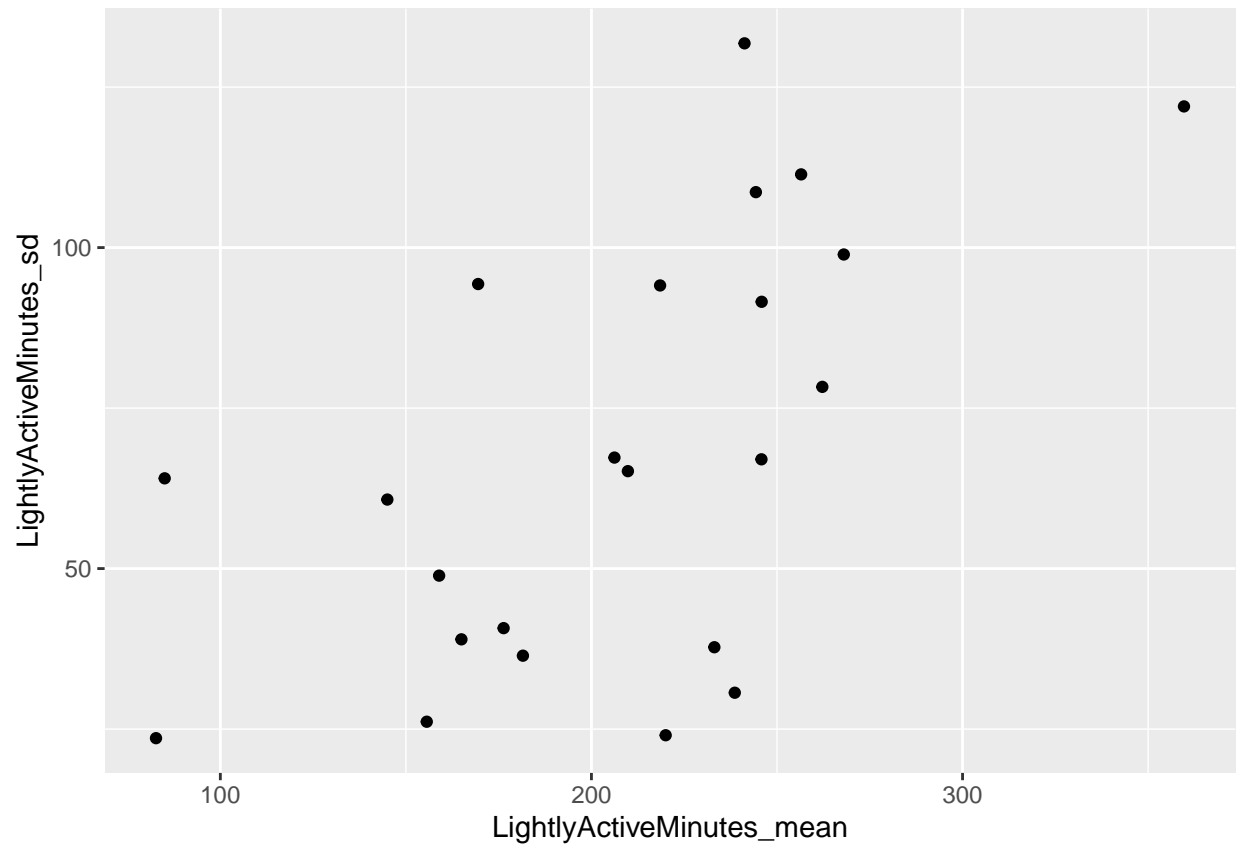
```
ggplot(Exercise_Minutes_Mean_SD,aes(x=VeryActiveMinutes_mean,y=VeryActiveMinutes_sd)) + geom_point()
```



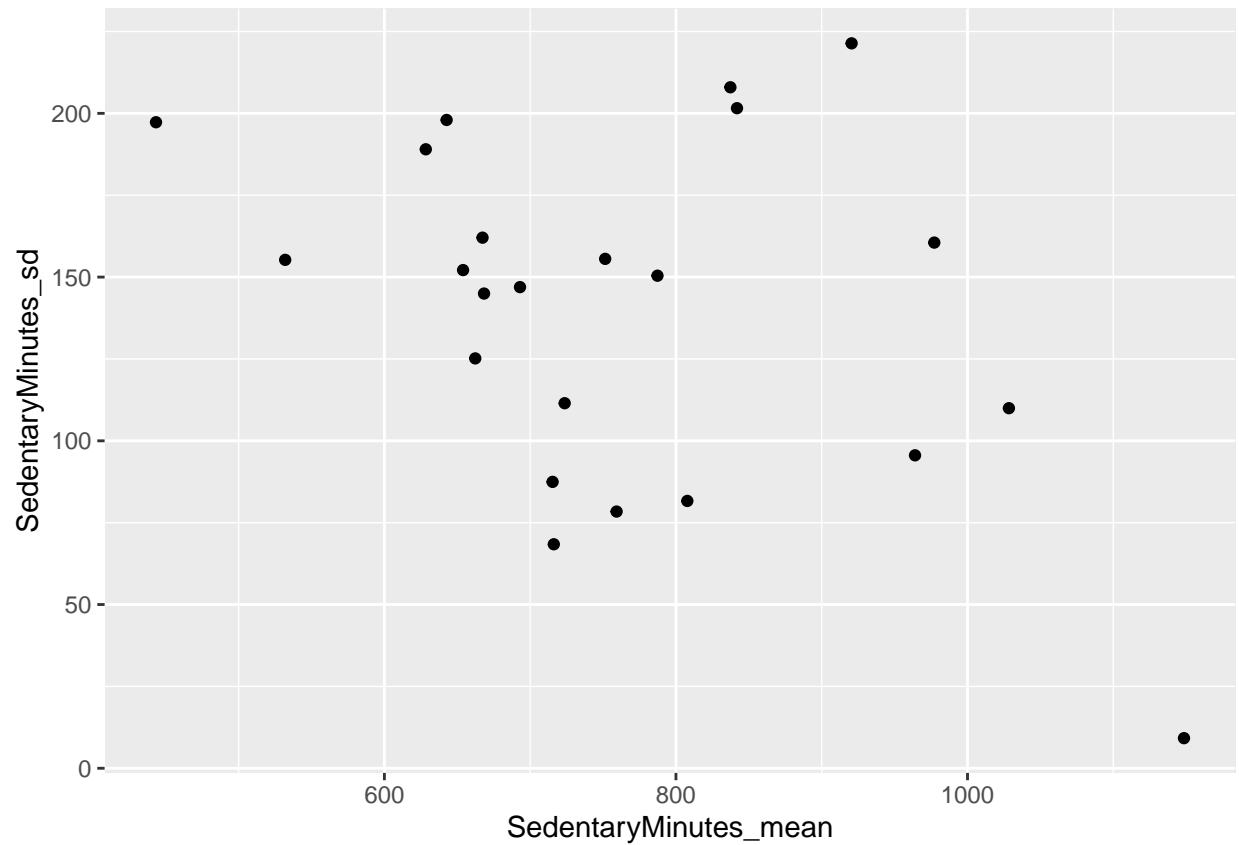
```
ggplot(Exercise_Minutes_Mean_SD,aes(x=FairlyActiveMinutes_mean,y=FairlyActiveMinutes_sd)) + geom_point()
```



```
ggplot(Exercise_Minutes_Mean_SD,aes(x=LightlyActiveMinutes_mean,y=LightlyActiveMinutes_sd)) + geom_point
```



```
ggplot(Exercise_Minutes_Mean_SD,aes(x=SedentaryMinutes_mean,y=SedentaryMinutes_sd)) + geom_point()
```

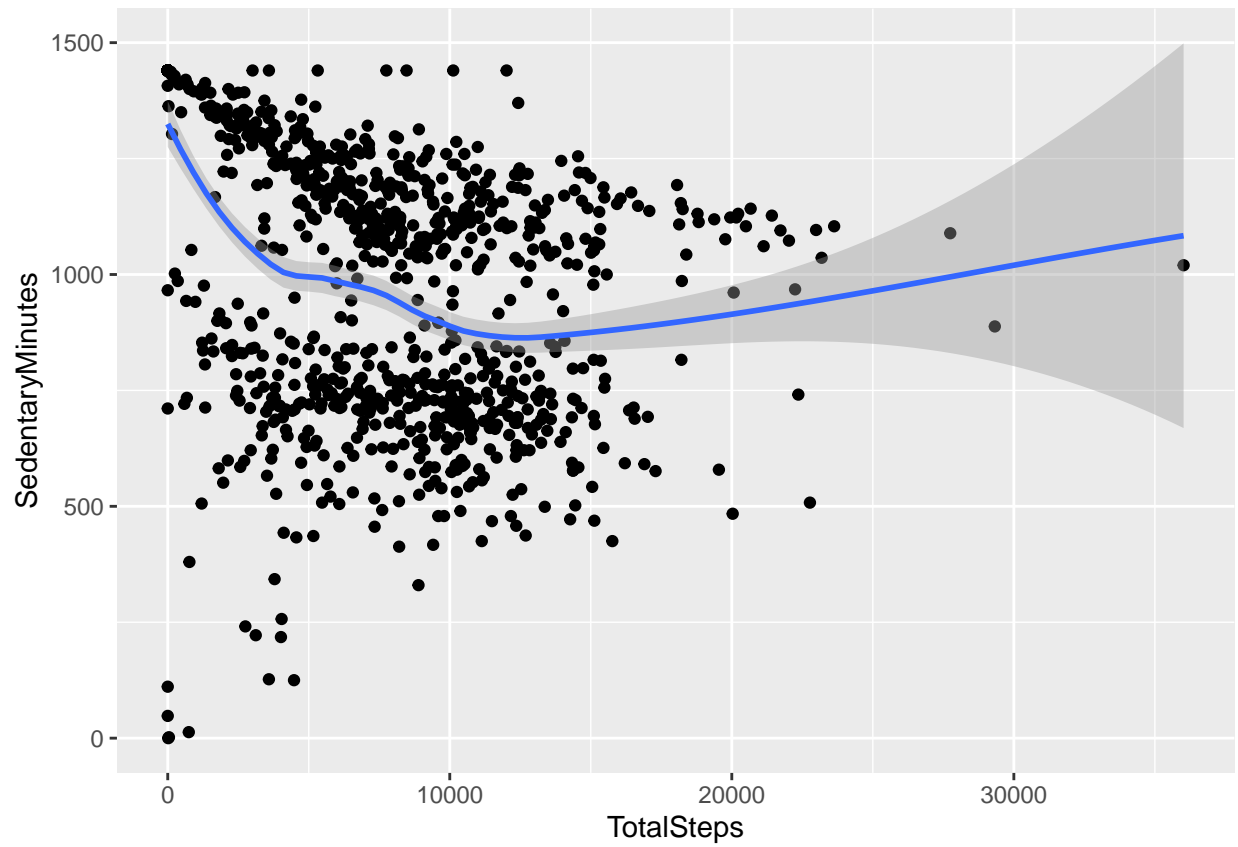


```
#Graphs
```

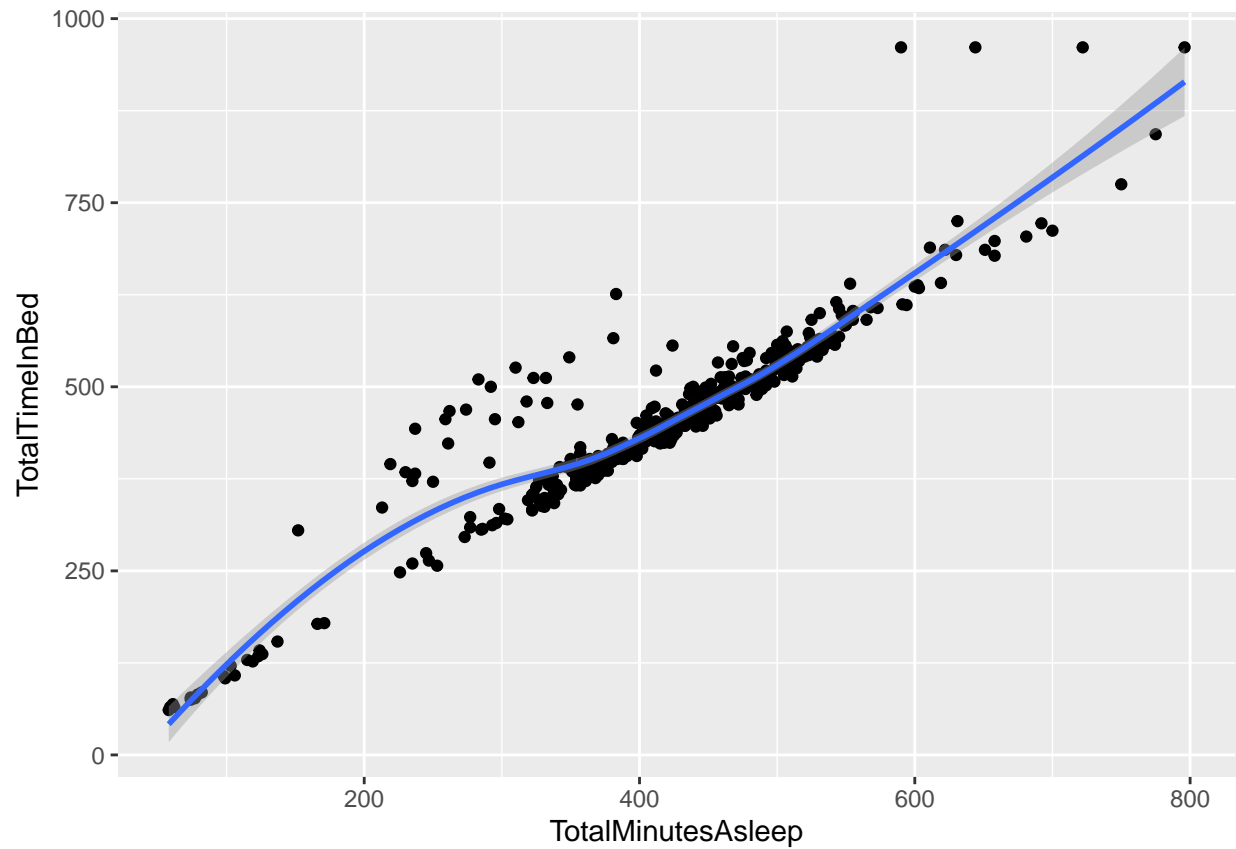
```
#Basic Graphs from case study description
```

```
ggplot(data=Activity_Day_Sleep_Day,aes(x=TotalSteps,y=SedentaryMinutes)) + geom_point() + geom_smooth()
```





```
ggplot(data=Activity_Day_Sleep_Day,aes(x=TotalMinutesAsleep,y=TotalTimeInBed)) + geom_point() + geom_smooth()
```



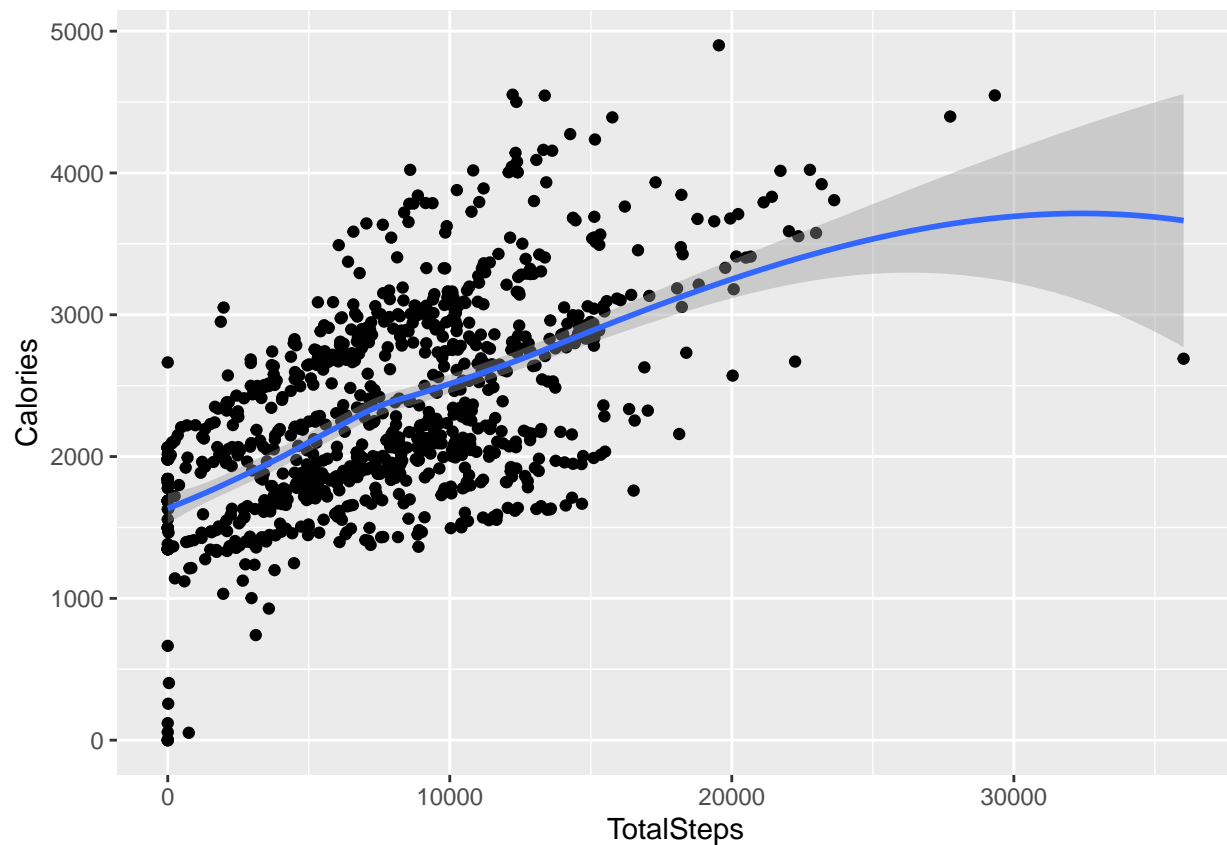
## Graphs and Correlation

*#Investigating Correlations alongside Graphs*

*#High Correlation between Steps and Calories Burned*

```
ggplot(data=Activity_Day_Sleep_Day,aes(x=TotalSteps,y=Calories)) + geom_point() + geom_smooth()
```

```
## 'geom_smooth()' using method = 'loess' and formula 'y ~ x'
```



```
cor(Activity_Day_Sleep_Day$TotalSteps,Activity_Day_Sleep_Day$Calories,use="complete.obs")
```

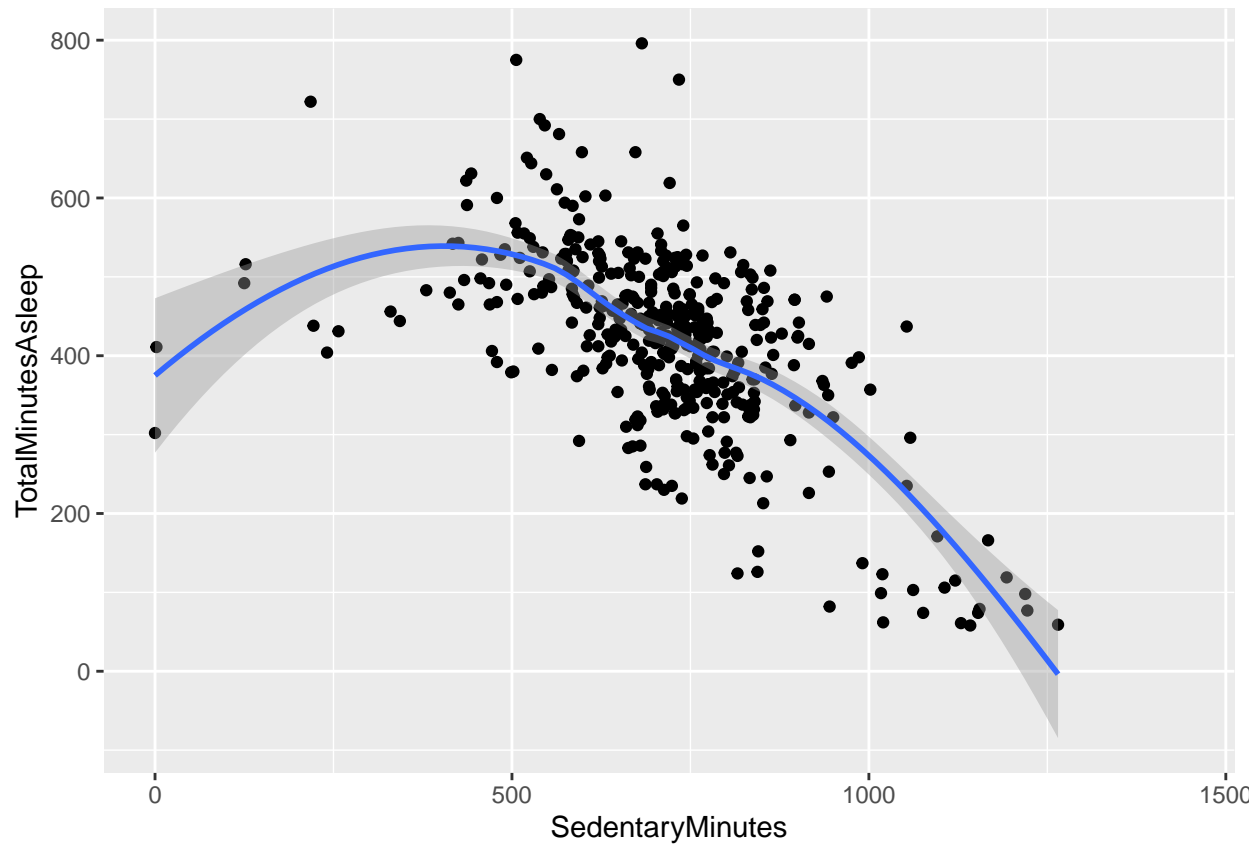
```
## [1] 0.5929493
```

```
#High Correlation - Less Sleep - More Sedentary Minutes, but also some outliers with 0 Sedentary Minutes.  
ggplot(data=Activity_Day_Sleep_Day, aes(x=SedentaryMinutes, y=TotalMinutesAsleep)) + geom_point() + geom_smooth()
```

```
## 'geom_smooth()' using method = 'loess' and formula 'y ~ x'
```

```
## Warning: Removed 530 rows containing non-finite values (stat_smooth).
```

```
## Warning: Removed 530 rows containing missing values (geom_point).
```



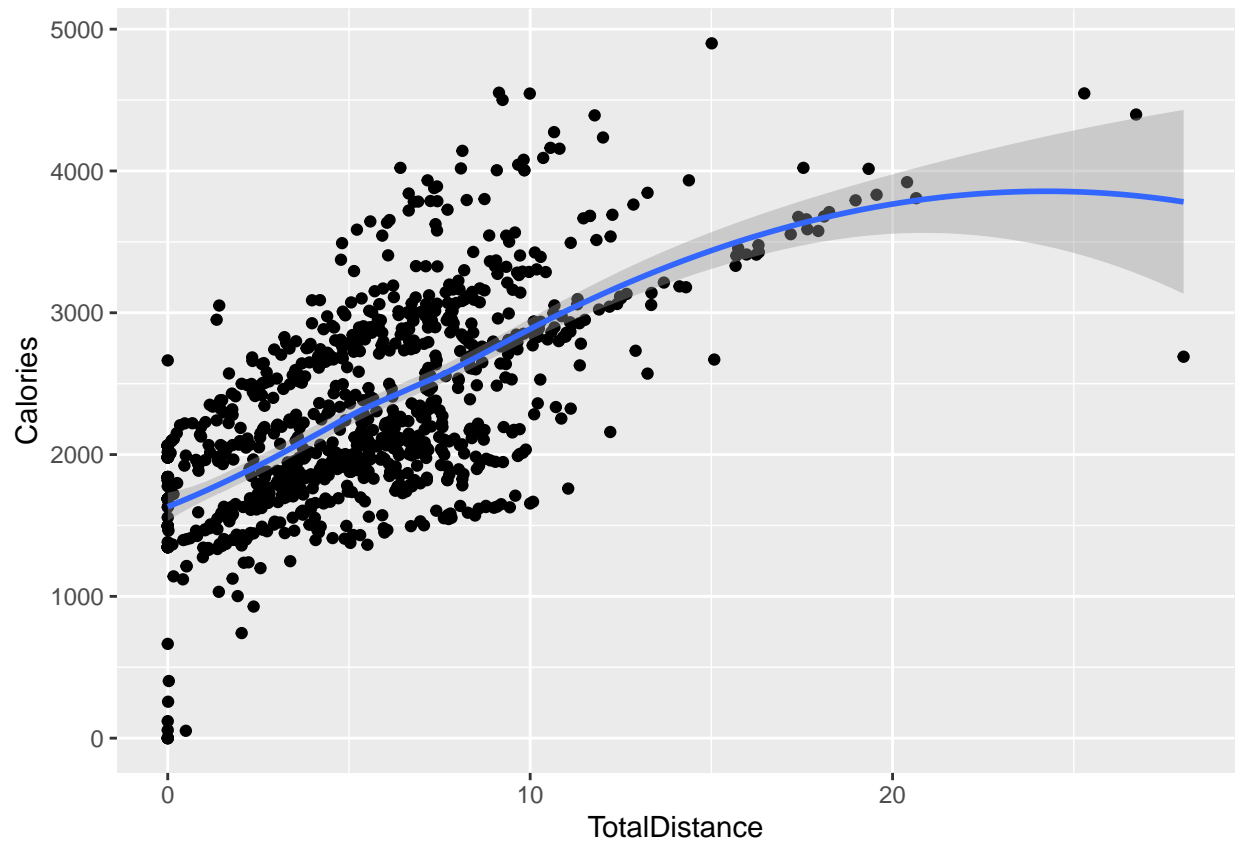
```
cor(Activity_Day_Sleep_Day$SedentaryMinutes,Activity_Day_Sleep_Day$TotalMinutesAsleep,use="complete.obs")
```

```
## [1] -0.599394
```

```
#High (Obvious) Correlation More Distance = More Calories Burned
```

```
ggplot(data=Activity_Day_Sleep_Day, aes(x=TotalDistance, y=Calories)) + geom_point() + geom_smooth()
```

```
## 'geom_smooth()' using method = 'loess' and formula 'y ~ x'
```



```
cor(Activity_Day_Sleep_Day$TotalDistance,Activity_Day_Sleep_Day$Calories,use="complete.obs")
```

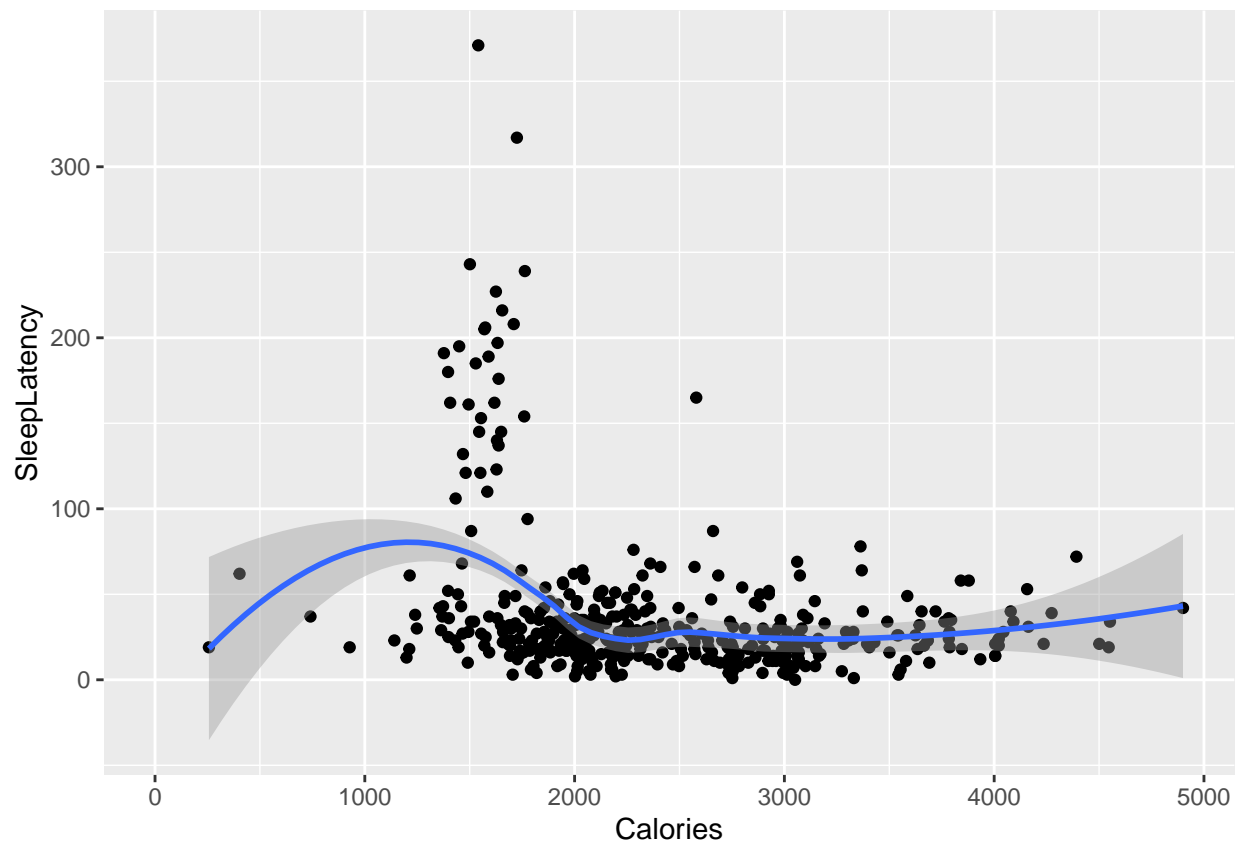
```
## [1] 0.6466023
```

```
#Low Negative Correlation - Sleep Latency might be caused by not enough calories burned for excess ener  
ggplot(data=Activity_Day_Sleep_Day, aes(x=Calories, y=SleepLatency)) + geom_point() + geom_smooth()
```

```
## 'geom_smooth()' using method = 'loess' and formula 'y ~ x'
```

```
## Warning: Removed 530 rows containing non-finite values (stat_smooth).
```

```
## Removed 530 rows containing missing values (geom_point).
```



```
cor(Activity_Day_Sleep_Day$Calories,Activity_Day_Sleep_Day$SleepLatency,use="complete.obs")
```

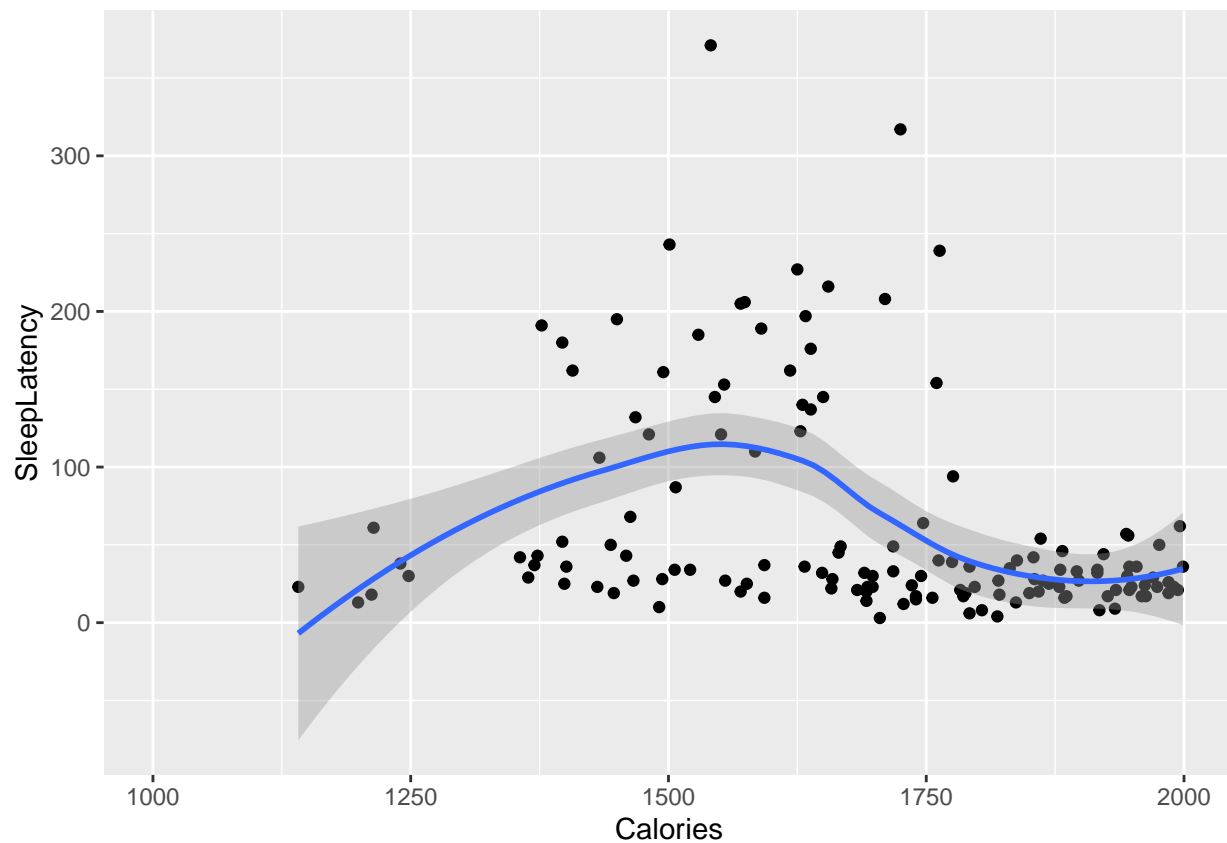
```
## [1] -0.2891555
```

```
#What if we look at the range from 1000-2000 Calories?
Activity_Day_Sleep_Day %>%
  filter(between(Calories,1000,2000)) %>%
  ggplot(aes(x=Calories,y=SleepLatency)) + geom_point() + geom_smooth()
```

```
## 'geom_smooth()' using method = 'loess' and formula 'y ~ x'
```

```
## Warning: Removed 218 rows containing non-finite values (stat_smooth).
```

```
## Warning: Removed 218 rows containing missing values (geom_point).
```



```
Activity_Day_Sleep_Day %>%
  filter(between(Calories,1000,2000)) %>%
  summarise(cor(Calories, SleepLatency, use = "complete.obs"))
```

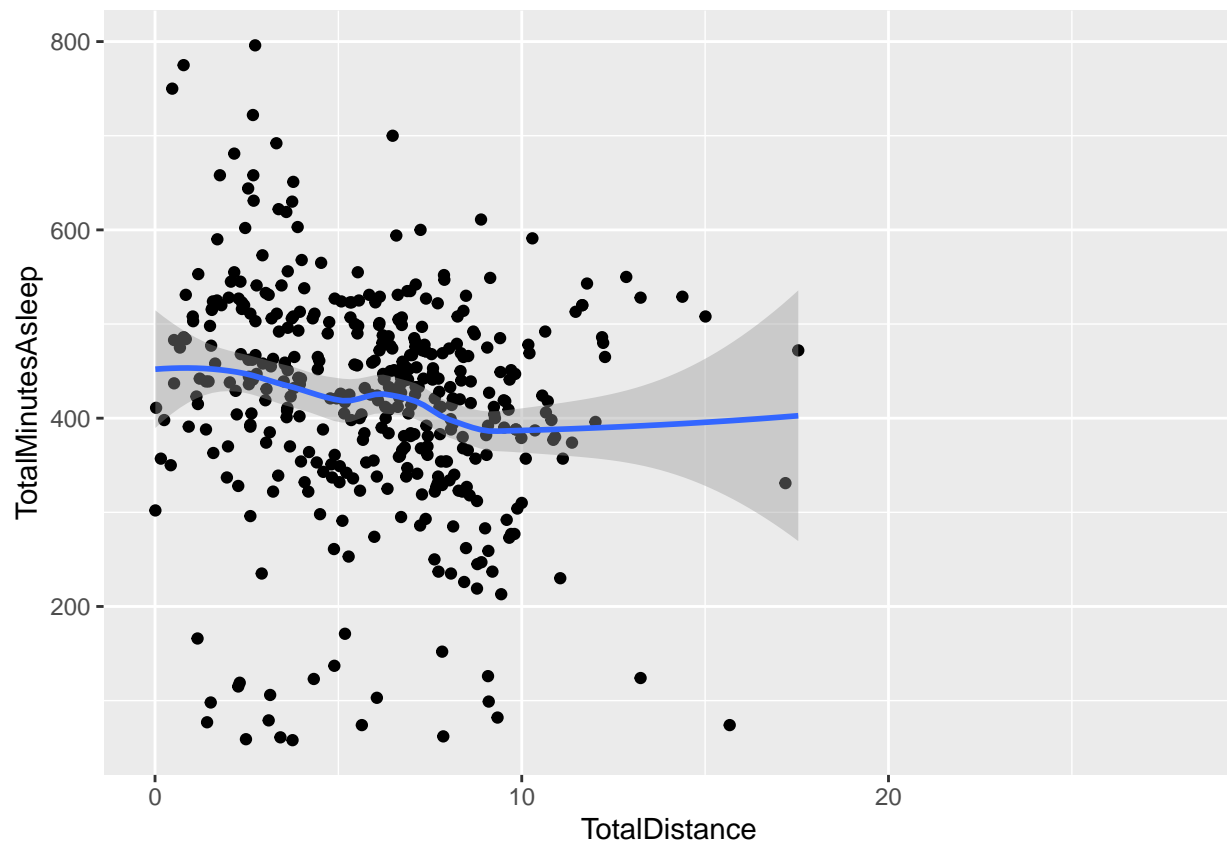
```
## cor(Calories, SleepLatency, use = "complete.obs")
## 1 -0.277088
```

```
#More Exercise and Less Sedentary Minutes = Less Minutes Asleep (Possibly more rested or better quality
ggplot(data=Activity_Day_Sleep_Day, aes(x=TotalDistance, y=TotalMinutesAsleep)) + geom_point() + geom_s
```

```
## 'geom_smooth()' using method = 'loess' and formula 'y ~ x'
```

```
## Warning: Removed 530 rows containing non-finite values (stat_smooth).
```

```
## Warning: Removed 530 rows containing missing values (geom_point).
```



```
cor(Activity_Day_Sleep_Day$TotalDistance,Activity_Day_Sleep_Day$TotalMinutesAsleep,use="complete.obs")
```

```
## [1] -0.1721427
```

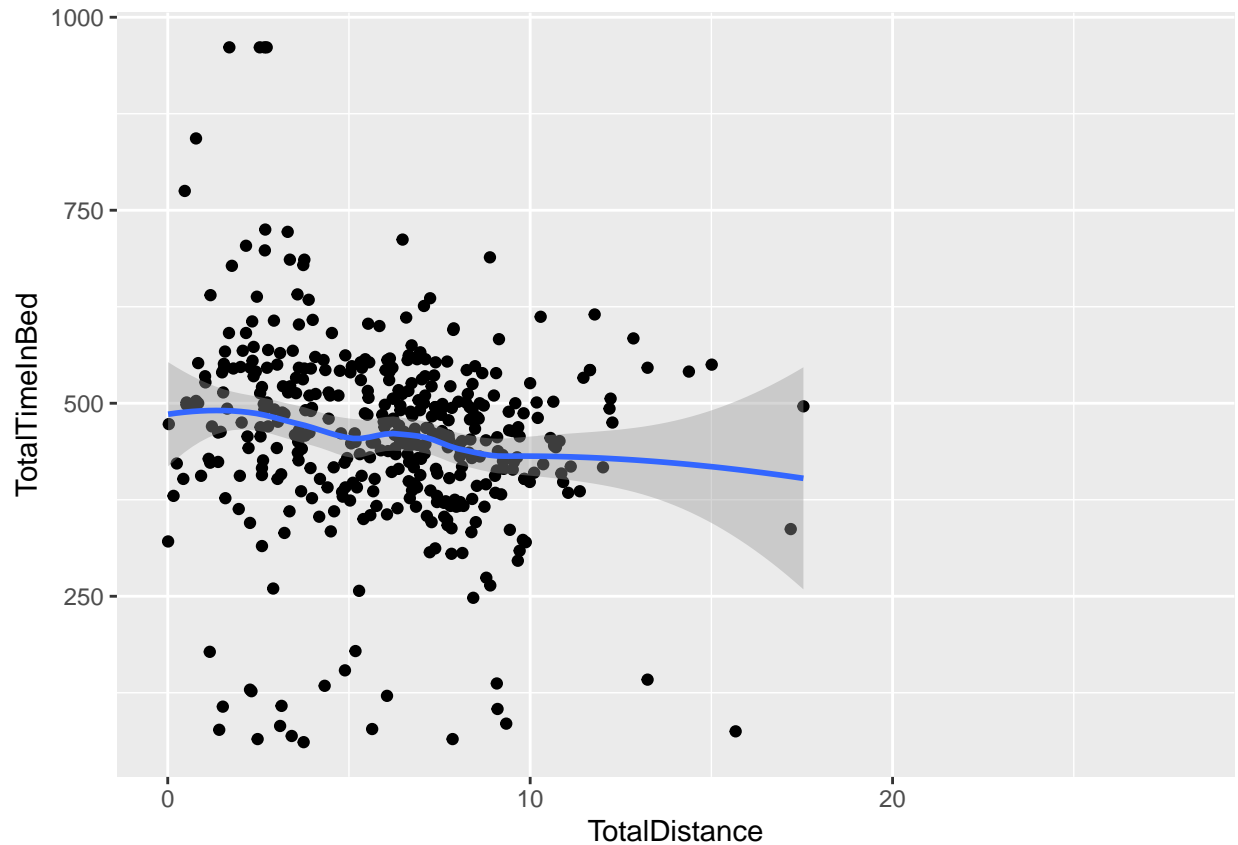
```
ggplot(data=Activity_Day_Sleep_Day, aes(x=TotalDistance, y=TotalTimeInBed)) + geom_point() + geom_smooth
```

```
## 'geom_smooth()' using method = 'loess' and formula 'y ~ x'
```

```
## Warning: Removed 530 rows containing non-finite values (stat_smooth).
```

```
## Removed 530 rows containing missing values (geom_point).
```





```
cor(Activity_Day_Sleep_Day$TotalDistance,Activity_Day_Sleep_Day$TotalTimeInBed,use="complete.obs")
```

```
## [1] -0.1580949
```

```
#Low Correlation Data
```

```
#Calories Burned vs Sleep -
```

```
#Maybe having too much energy from not burning enough for some people?
```

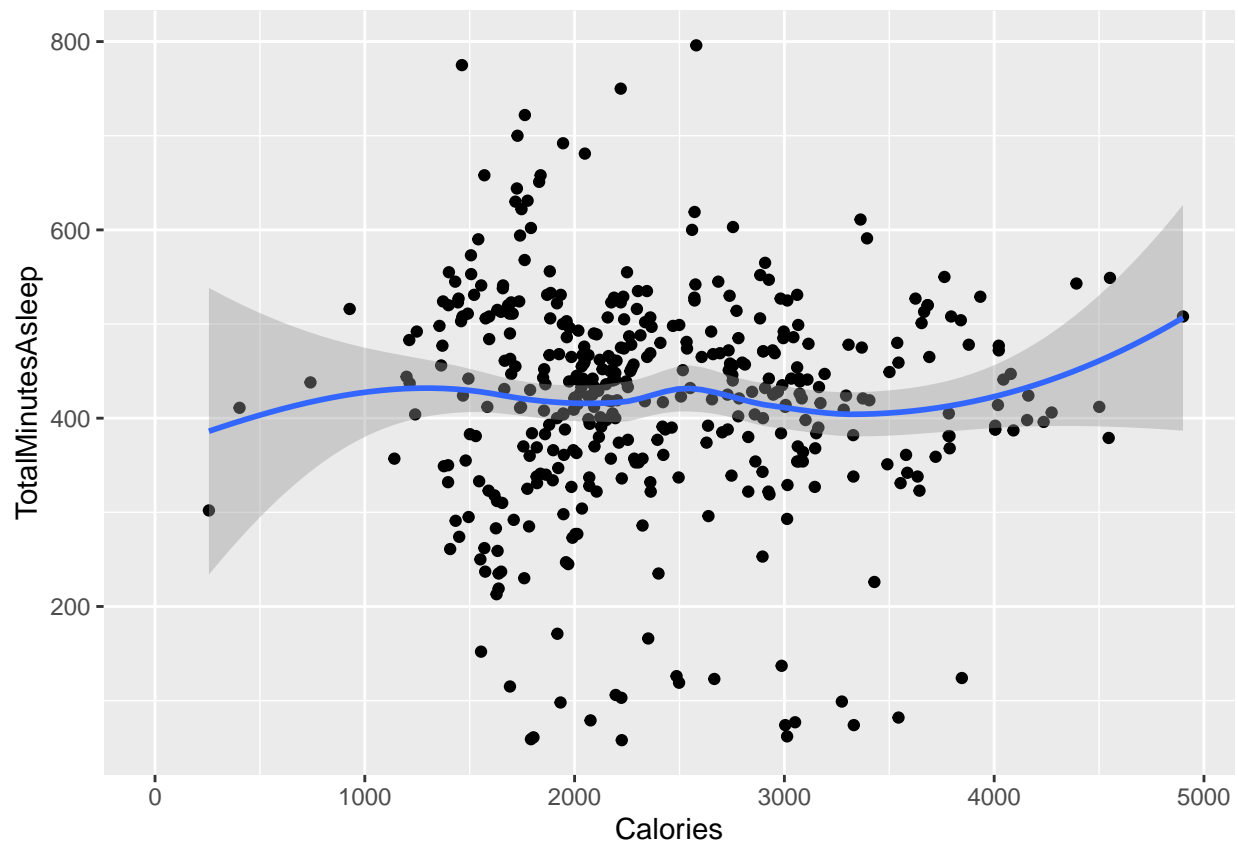
```
#No clear relationship between Minutes Asleep and Calories burned here
```

```
ggplot(data=Activity_Day_Sleep_Day, aes(x=Calories, y=TotalMinutesAsleep)) + geom_point() + geom_smooth
```

```
## 'geom_smooth()' using method = 'loess' and formula 'y ~ x'
```

```
## Warning: Removed 530 rows containing non-finite values (stat_smooth).
```

```
## Warning: Removed 530 rows containing missing values (geom_point).
```



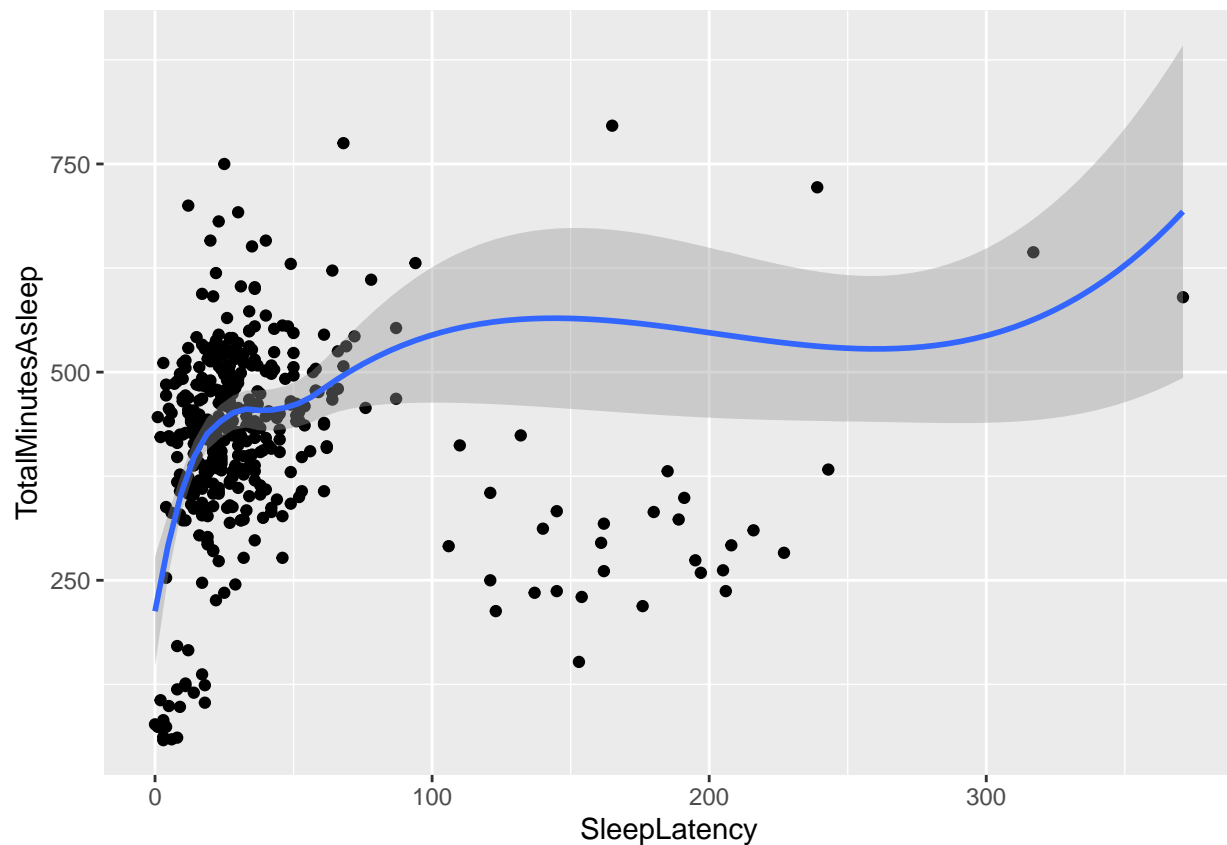
```
cor(Activity_Day_Sleep_Day$Calories,Activity_Day_Sleep_Day$TotalMinutesAsleep,use="complete.obs")
```

```
## [1] -0.02852571
```

```
#Normal Minutes Asleep (~5-8 hrs), people that sleep less more likely to spend more time in bed (trying
ggplot(data=Activity_Day_Sleep_Day, aes(x=SleepLatency, y=TotalMinutesAsleep)) + geom_point() + geom_smooth()
```

```
## 'geom_smooth()' using method = 'loess' and formula 'y ~ x'
```

```
## Warning: Removed 530 rows containing non-finite values (stat_smooth).
## Removed 530 rows containing missing values (geom_point).
```



```
cor(Activity_Day_Sleep_Day$SleepLatency,Activity_Day_Sleep_Day$TotalMinutesAsleep,use="complete.obs")
```

```
## [1] -0.001761677
```

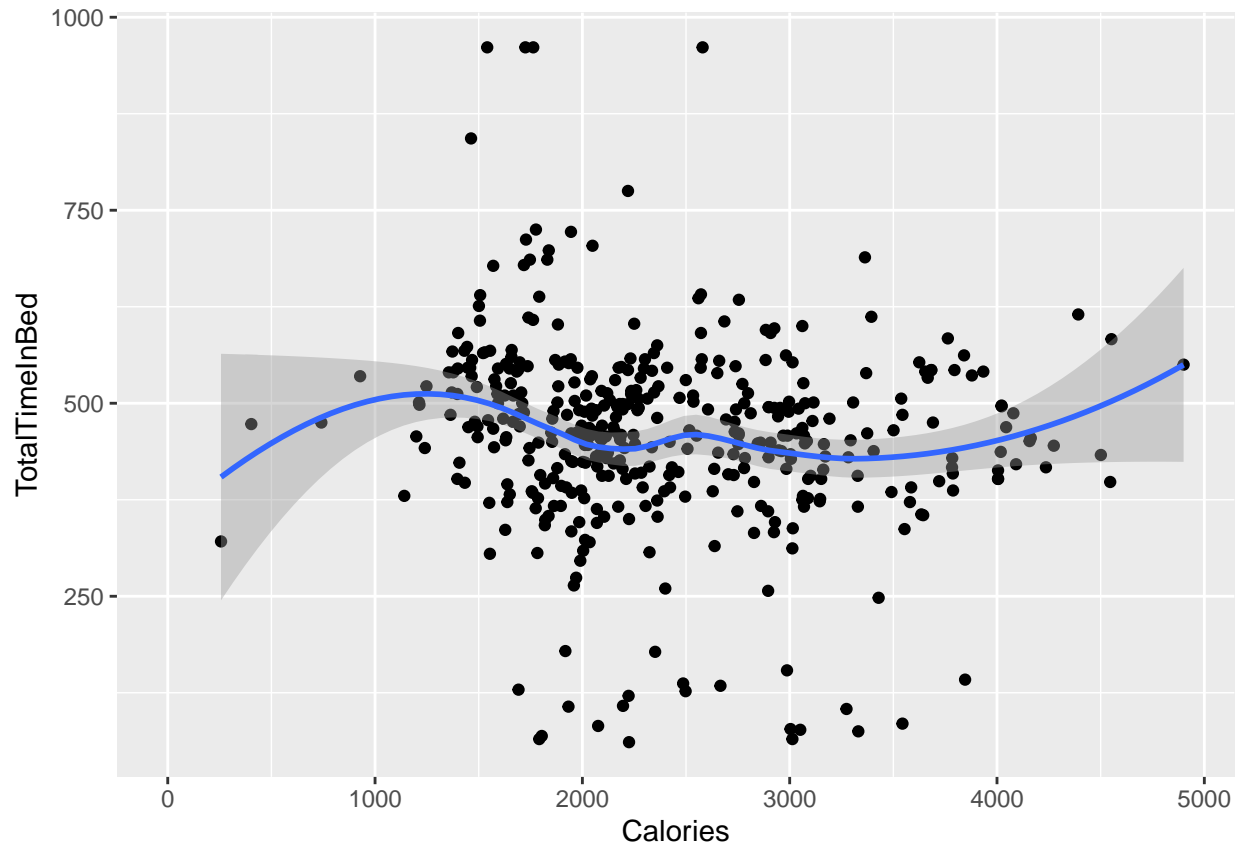
```
#Calories and Total Time in Bed
```

```
ggplot(data=Activity_Day_Sleep_Day,aes(x=Calories,y=TotalTimeInBed)) + geom_point() + geom_smooth()
```

```
## 'geom_smooth()' using method = 'loess' and formula 'y ~ x'
```

```
## Warning: Removed 530 rows containing non-finite values (stat_smooth).
```

```
## Removed 530 rows containing missing values (geom_point).
```



```
cor(Activity_Day_Sleep_Day$Calories,Activity_Day_Sleep_Day$TotalTimeInBed,use="complete.obs")
```

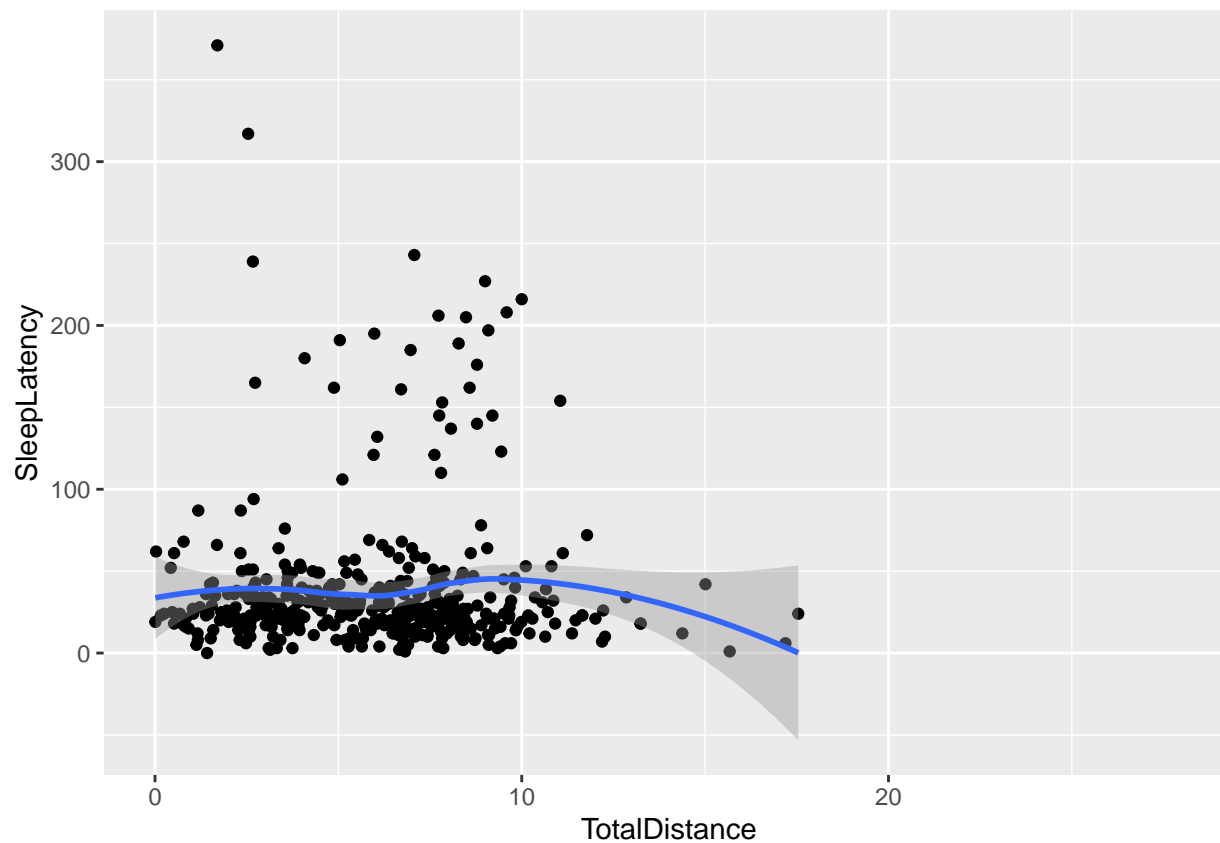
```
## [1] -0.1325071
```

```
#Does More Exercise Lower Sleep Latency? Not such a clear relationship, possibly too many external vari  
ggplot(data=Activity_Day_Sleep_Day, aes(x=TotalDistance, y=SleepLatency)) + geom_point() + geom_smooth()
```

```
## 'geom_smooth()' using method = 'loess' and formula 'y ~ x'
```

```
## Warning: Removed 530 rows containing non-finite values (stat_smooth).
```

```
## Removed 530 rows containing missing values (geom_point).
```



```
cor(Activity_Day_Sleep_Day$Calories,Activity_Day_Sleep_Day$TotalTimeInBed,use="complete.obs")
```

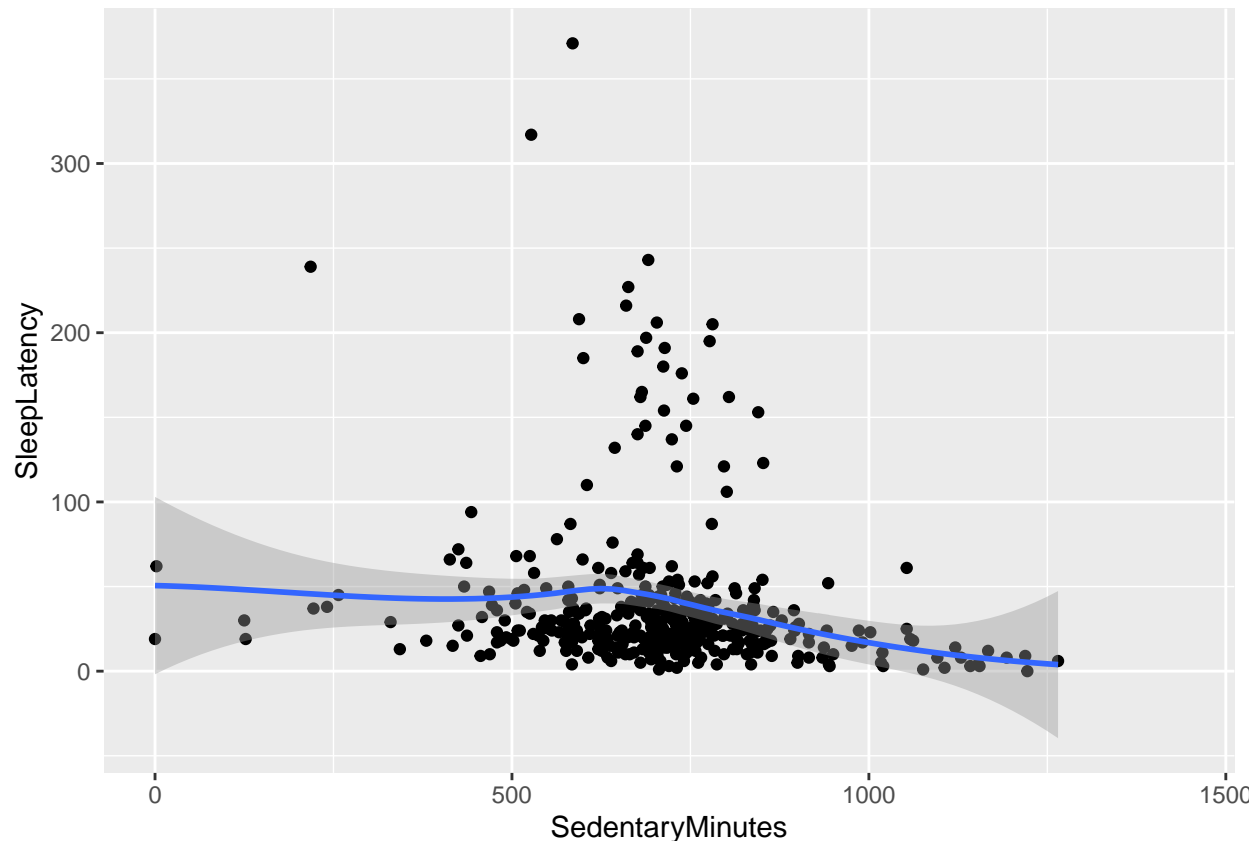
```
## [1] -0.1325071
```

```
ggplot(data=Activity_Day_Sleep_Day, aes(x=SedentaryMinutes, y=SleepLatency)) + geom_point() + geom_smooth
```

```
## 'geom_smooth()' using method = 'loess' and formula 'y ~ x'
```

```
## Warning: Removed 530 rows containing non-finite values (stat_smooth).
```

```
## Removed 530 rows containing missing values (geom_point).
```



```
cor(Activity_Day_Sleep_Day$Calories,Activity_Day_Sleep_Day$TotalTimeInBed,use="complete.obs")
```

```
## [1] -0.1325071
```

## Data Bulletpoints

More Distance and Steps Correlated to more Calories Burned Less Sleep Correlated with More Sedentary Minutes that day Less sleep, lower energy for exercise? More Exercise and Less Sedentary Minutes = Less Minutes Asleep More exercise, higher sleep quality and thus less minutes asleep? Low Negative Correlation between Calories and Sleep Latency Could this be due to less calories burned keeping people awake? Lack of Food or Exercise?

## Product Suggestions

My product suggestion or improvement for Bellabeat would be directed at aiming to improve sleep and exercise, working to balance and help schedule Bellabeat users both exercise consistently and sleep consistently for better motivation and higher quality sleep.

By further analyzing what general data says about the quality and quantity of sleep in correlation with various factors of exercise, such as the time exercise takes place as well as the length and intensity of it, we can draw some ideas on what general suggestions to make to people.

Depending on the future analysis, we might break down users by their fitness and make suggestions such as getting at least 30 minutes of intense exercise per day and encourage them to consistently sleep for healthy

amounts to help them reinforce their exercise habits with the extra willpower and motivation that can come from it.

I'm not an expert when it comes to mobile apps and so I think it would be best to explore how mobile apps encourage users' habits utilizing rewards and other methods to see what would work best for Bellabeat and their users. One small way I can think of to encourage users is that once they have been active enough, showing off the data we've tracked about their progress and success, such as streaks or improvements in exercise and sleep.

Figuring out how to implement these app improvements would be highly beneficial to Bellabeat and their users by helping reinforce and benefit exercise and sleep, and thereby the use of the app as a means to do so.