Fitbit

Siddiq Khan

2025-02-11

R Markdown

```
library(tidyverse)
```

```
## Warning: package 'tidyverse' was built under R version 4.2.3
```

```
## Warning: package 'ggplot2' was built under R version 4.2.3
```

```
## ── Attaching core tidyverse packages ──────────────────────── tidyverse 2.0.0 ──
## ✔ dplyr     1.1.0     ✔ readr     2.1.4
## ✔ forcats   1.0.0     ✔ stringr   1.5.0
## ✔ ggplot2   3.4.3     ✔ tibble    3.1.8
## ✔ lubridate 1.9.2     ✔ tidyr     1.3.0
## ✔ purrr     1.0.1
## ── Conflicts ──────────────────────────────────────────── tidyverse_conflicts() ──
## ✖ dplyr::filter() masks stats::filter()
## ✖ dplyr::lag()    masks stats::lag()
## ℹ Use the ]8;;http://conflicted.r-lib.org/conflicted package]8;; to force all conflict
s to become errors
```

```
library(janitor)
```

```
##
## Attaching package: 'janitor'
```

```
## The following objects are masked from 'package:stats':
##
##     chisq.test, fisher.test
```

```
activity <- read_csv("dailyActivity_merged.csv")
```

```
## Rows: 940 Columns: 15
## ── Column specification ────────────────────────────────────────────────────────
## Delimiter: ","
## chr  (1): ActivityDate
## dbl (14): Id, TotalSteps, TotalDistance, TrackerDistance, LoggedActivitiesDi...
##
## ℹ Use `spec()` to retrieve the full column specification for this data.
## ℹ Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

```
h_steps <- read_csv("hourlySteps_merged.csv", col_names = TRUE)
```

```
## Rows: 22099 Columns: 3
## ── Column specification ────────────────────────────────────────────────────────
## Delimiter: ","
## chr (1): ActivityHour
## dbl (2): Id, StepTotal
##
## ℹ Use `spec()` to retrieve the full column specification for this data.
## ℹ Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

```
sleep <- read_csv("sleepDay_merged.csv", col_names = TRUE)
```

```
## Rows: 413 Columns: 5
## ── Column specification ────────────────────────────────────────────────────────
## Delimiter: ","
## chr (1): SleepDay
## dbl (4): Id, TotalSleepRecords, TotalMinutesAsleep, TotalTimeInBed
##
## ℹ Use `spec()` to retrieve the full column specification for this data.
## ℹ Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

```
weight <- read_csv("weightLogInfo_merged.csv")
```

```
## Rows: 67 Columns: 8
## ── Column specification ────────────────────────────────────────────────────────
## Delimiter: ","
## chr (1): Date
## dbl (6): Id, WeightKg, WeightPounds, Fat, BMI, LogId
## lgl (1): IsManualReport
##
## ℹ Use `spec()` to retrieve the full column specification for this data.
## ℹ Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

```
head(activity)
```

```
## # A tibble: 6 × 15
##       Id Activ…¹ Total…² Total…³ Track…⁴ Logge…⁵ VeryA…⁶ Moder…⁷ Light…⁸ Seden…⁹
##    <dbl> <chr>     <dbl>   <dbl>   <dbl>   <dbl>   <dbl>   <dbl>   <dbl>   <dbl>
## 1 1.50e9 4/12/2…   13162    8.5     8.5        0    1.88   0.550    6.06       0
## 2 1.50e9 4/13/2…   10735    6.97    6.97       0    1.57   0.690    4.71       0
## 3 1.50e9 4/14/2…   10460    6.74    6.74       0    2.44   0.400    3.91       0
## 4 1.50e9 4/15/2…    9762    6.28    6.28       0    2.14   1.26     2.83       0
## 5 1.50e9 4/16/2…   12669    8.16    8.16       0    2.71   0.410    5.04       0
## 6 1.50e9 4/17/2…    9705    6.48    6.48       0    3.19   0.780    2.51       0
## # … with 5 more variables: VeryActiveMinutes <dbl>, FairlyActiveMinutes <dbl>,
## #   LightlyActiveMinutes <dbl>, SedentaryMinutes <dbl>, Calories <dbl>, and
## #   abbreviated variable names ¹ActivityDate, ²TotalSteps, ³TotalDistance,
## #   ⁴TrackerDistance, ⁵LoggedActivitiesDistance, ⁶VeryActiveDistance,
## #   ⁷ModeratelyActiveDistance, ⁸LightActiveDistance, ⁹SedentaryActiveDistance
```

```
glimpse(activity)
```

```
## Rows: 940
## Columns: 15
## $ Id                       <dbl> 1503960366, 1503960366, 1503960366, 150396036…
## $ ActivityDate             <chr> "4/12/2016", "4/13/2016", "4/14/2016", "4/15/…
## $ TotalSteps               <dbl> 13162, 10735, 10460, 9762, 12669, 9705, 13019…
## $ TotalDistance            <dbl> 8.50, 6.97, 6.74, 6.28, 8.16, 6.48, 8.59, 9.8…
## $ TrackerDistance          <dbl> 8.50, 6.97, 6.74, 6.28, 8.16, 6.48, 8.59, 9.8…
## $ LoggedActivitiesDistance <dbl> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, …
## $ VeryActiveDistance       <dbl> 1.88, 1.57, 2.44, 2.14, 2.71, 3.19, 3.25, 3.5…
## $ ModeratelyActiveDistance <dbl> 0.55, 0.69, 0.40, 1.26, 0.41, 0.78, 0.64, 1.3…
## $ LightActiveDistance      <dbl> 6.06, 4.71, 3.91, 2.83, 5.04, 2.51, 4.71, 5.0…
## $ SedentaryActiveDistance  <dbl> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, …
## $ VeryActiveMinutes        <dbl> 25, 21, 30, 29, 36, 38, 42, 50, 28, 19, 66, 4…
## $ FairlyActiveMinutes      <dbl> 13, 19, 11, 34, 10, 20, 16, 31, 12, 8, 27, 21…
## $ LightlyActiveMinutes     <dbl> 328, 217, 181, 209, 221, 164, 233, 264, 205, …
## $ SedentaryMinutes         <dbl> 728, 776, 1218, 726, 773, 539, 1149, 775, 818…
## $ Calories                 <dbl> 1985, 1797, 1776, 1745, 1863, 1728, 1921, 203…
```

```
head(h_steps)
```

```
## # A tibble: 6 × 3
##           Id ActivityHour          StepTotal
##        <dbl> <chr>                     <dbl>
## 1 1503960366 4/12/2016 12:00:00 AM       373
## 2 1503960366 4/12/2016 1:00:00 AM        160
## 3 1503960366 4/12/2016 2:00:00 AM        151
## 4 1503960366 4/12/2016 3:00:00 AM          0
## 5 1503960366 4/12/2016 4:00:00 AM          0
## 6 1503960366 4/12/2016 5:00:00 AM          0
```

```
glimpse(h_steps)
```

```
## Rows: 22,099
## Columns: 3
## $ Id           <dbl> 1503960366, 1503960366, 1503960366, 1503960366, 150396036…
## $ ActivityHour <chr> "4/12/2016 12:00:00 AM", "4/12/2016 1:00:00 AM", "4/12/20…
## $ StepTotal    <dbl> 373, 160, 151, 0, 0, 0, 0, 0, 250, 1864, 676, 360, 253, 2…
```

```
colnames(sleep)
```

```
## [1] "Id"                 "SleepDay"           "TotalSleepRecords"
## [4] "TotalMinutesAsleep" "TotalTimeInBed"
```

```
head(sleep)
```

```
## # A tibble: 6 × 5
##           Id SleepDay              TotalSleepRecords TotalMinutesAsleep TotalT…¹
##        <dbl> <chr>                             <dbl>              <dbl>    <dbl>
## 1 1503960366 4/12/2016 12:00:00 AM                 1                327      346
## 2 1503960366 4/13/2016 12:00:00 AM                 2                384      407
## 3 1503960366 4/15/2016 12:00:00 AM                 1                412      442
## 4 1503960366 4/16/2016 12:00:00 AM                 2                340      367
## 5 1503960366 4/17/2016 12:00:00 AM                 1                700      712
## 6 1503960366 4/19/2016 12:00:00 AM                 1                304      320
## # … with abbreviated variable name ¹TotalTimeInBed
```

```
glimpse(sleep)
```

```
## Rows: 413
## Columns: 5
## $ Id                 <dbl> 1503960366, 1503960366, 1503960366, 1503960366, 150…
## $ SleepDay           <chr> "4/12/2016 12:00:00 AM", "4/13/2016 12:00:00 AM", "…
## $ TotalSleepRecords  <dbl> 1, 2, 1, 2, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, …
## $ TotalMinutesAsleep <dbl> 327, 384, 412, 340, 700, 304, 360, 325, 361, 430, 2…
## $ TotalTimeInBed     <dbl> 346, 407, 442, 367, 712, 320, 377, 364, 384, 449, 3…
```

```
head(weight)
```

```
## # A tibble: 6 × 8
##           Id Date                  WeightKg Weight…¹   Fat   BMI IsMan…²   LogId
##        <dbl> <chr>                    <dbl>    <dbl> <dbl> <dbl> <lgl>     <dbl>
## 1 1503960366 5/2/2016 11:59:59 PM      52.6     116.    22  22.6 TRUE    1.46e12
## 2 1503960366 5/3/2016 11:59:59 PM      52.6     116.    NA  22.6 TRUE    1.46e12
## 3 1927972279 4/13/2016 1:08:52 AM     134.      294.    NA  47.5 FALSE   1.46e12
## 4 2873212765 4/21/2016 11:59:59 PM     56.7     125.    NA  21.5 TRUE    1.46e12
## 5 2873212765 5/12/2016 11:59:59 PM     57.3     126.    NA  21.7 TRUE    1.46e12
## 6 4319703577 4/17/2016 11:59:59 PM     72.4     160.    25  27.5 TRUE    1.46e12
## # … with abbreviated variable names ¹WeightPounds, ²IsManualReport
```

```
glimpse(weight)
```

```
## Rows: 67
## Columns: 8
## $ Id             <dbl> 1503960366, 1503960366, 1927972279, 2873212765, 2873212…
## $ Date           <chr> "5/2/2016 11:59:59 PM", "5/3/2016 11:59:59 PM", "4/13/2…
## $ WeightKg       <dbl> 52.6, 52.6, 133.5, 56.7, 57.3, 72.4, 72.3, 69.7, 70.3, …
## $ WeightPounds   <dbl> 115.9631, 115.9631, 294.3171, 125.0021, 126.3249, 159.6…
## $ Fat            <dbl> 22, NA, NA, NA, NA, 25, NA, NA, NA, NA, NA, NA, NA, NA,…
## $ BMI            <dbl> 22.65, 22.65, 47.54, 21.45, 21.69, 27.45, 27.38, 27.25,…
## $ IsManualReport <lgl> TRUE, TRUE, FALSE, TRUE, TRUE, TRUE, TRUE, TRUE, TRUE, …
## $ LogId          <dbl> 1.462234e+12, 1.462320e+12, 1.460510e+12, 1.461283e+12,…
```

```
n_distinct(activity$Id)
```

```
## [1] 33
```

```
n_distinct(h_steps$Id)
```

```
## [1] 33
```

```
n_distinct(sleep$Id)
```

```
## [1] 24
```

```
n_distinct(weight$Id)
```

```
## [1] 8
```

```
sum(duplicated(activity))
```

```
## [1] 0
```

```
sum(duplicated(h_steps))
```

```
## [1] 0
```

```
sum(duplicated(sleep))
```

```
## [1] 3
```

```
sleep <- unique(sleep)
sum(duplicated(sleep))
```

```
## [1] 0
```

```
clean_names(activity)
```

```
## # A tibble: 940 × 15
##            id activity…¹ total…² total…³ track…⁴ logge…⁵ very_…⁶ moder…⁷ light…⁸
##         <dbl> <chr>        <dbl>   <dbl>   <dbl>   <dbl>   <dbl>   <dbl>   <dbl>
##  1 1503960366 4/12/2016    13162    8.5     8.5        0    1.88   0.550    6.06
##  2 1503960366 4/13/2016    10735    6.97    6.97       0    1.57   0.690    4.71
##  3 1503960366 4/14/2016    10460    6.74    6.74       0    2.44   0.400    3.91
##  4 1503960366 4/15/2016     9762    6.28    6.28       0    2.14   1.26     2.83
##  5 1503960366 4/16/2016    12669    8.16    8.16       0    2.71   0.410    5.04
##  6 1503960366 4/17/2016     9705    6.48    6.48       0    3.19   0.780    2.51
##  7 1503960366 4/18/2016    13019    8.59    8.59       0    3.25   0.640    4.71
##  8 1503960366 4/19/2016    15506    9.88    9.88       0    3.53   1.32     5.03
##  9 1503960366 4/20/2016    10544    6.68    6.68       0    1.96   0.480    4.24
## 10 1503960366 4/21/2016     9819    6.34    6.34       0    1.34   0.350    4.65
## # … with 930 more rows, 6 more variables: sedentary_active_distance <dbl>,
## #   very_active_minutes <dbl>, fairly_active_minutes <dbl>,
## #   lightly_active_minutes <dbl>, sedentary_minutes <dbl>, calories <dbl>, and
## #   abbreviated variable names ¹activity_date, ²total_steps, ³total_distance,
## #   ⁴tracker_distance, ⁵logged_activities_distance, ⁶very_active_distance,
## #   ⁷moderately_active_distance, ⁸light_active_distance
```

```
 activity <- rename_with(activity, tolower)

clean_names(sleep)
```

```
## # A tibble: 410 × 5
##            id sleep_day             total_sleep_records total_minutes_…¹ total…²
##         <dbl> <chr>                               <dbl>            <dbl>   <dbl>
##  1 1503960366 4/12/2016 12:00:00 AM                   1              327     346
##  2 1503960366 4/13/2016 12:00:00 AM                   2              384     407
##  3 1503960366 4/15/2016 12:00:00 AM                   1              412     442
##  4 1503960366 4/16/2016 12:00:00 AM                   2              340     367
##  5 1503960366 4/17/2016 12:00:00 AM                   1              700     712
##  6 1503960366 4/19/2016 12:00:00 AM                   1              304     320
##  7 1503960366 4/20/2016 12:00:00 AM                   1              360     377
##  8 1503960366 4/21/2016 12:00:00 AM                   1              325     364
##  9 1503960366 4/23/2016 12:00:00 AM                   1              361     384
## 10 1503960366 4/24/2016 12:00:00 AM                   1              430     449
## # … with 400 more rows, and abbreviated variable names ¹total_minutes_asleep,
## #   ²total_time_in_bed
```

```
 sleep <- rename_with(sleep, tolower)

clean_names(h_steps)
```

```
## # A tibble: 22,099 × 3
##            id activity_hour         step_total
##         <dbl> <chr>                      <dbl>
##  1 1503960366 4/12/2016 12:00:00 AM        373
##  2 1503960366 4/12/2016 1:00:00 AM         160
##  3 1503960366 4/12/2016 2:00:00 AM         151
##  4 1503960366 4/12/2016 3:00:00 AM           0
##  5 1503960366 4/12/2016 4:00:00 AM           0
##  6 1503960366 4/12/2016 5:00:00 AM           0
##  7 1503960366 4/12/2016 6:00:00 AM           0
##  8 1503960366 4/12/2016 7:00:00 AM           0
##  9 1503960366 4/12/2016 8:00:00 AM         250
## 10 1503960366 4/12/2016 9:00:00 AM        1864
## # … with 22,089 more rows
```

```
 h_steps <- rename_with(h_steps, tolower)
```

```
 colnames(sleep)
```

```
## [1] "id"                 "sleepday"           "totalsleeprecords"
## [4] "totalminutesasleep" "totaltimeinbed"
```

```
activity <- activity %>%
  rename(date = activitydate) %>%
  mutate(date = as_date(date, format = "%m/%d/%Y"))

sleep <- sleep %>%
  rename(date = sleepday) %>%
  mutate(date = as_date(date, format = "%m/%d/%Y  %I:%M:%S %p"))

h_steps <- h_steps %>%
  rename(date_time = activityhour) %>%
  mutate(date_time = as.POSIXct(date_time, format="%m/%d/%Y %I:%M:%S %p"))
```

```
activity_sleep <- merge(activity, sleep, by = c("id","date"),
                        all.x = TRUE)
head(activity_sleep)
```

```
##           id       date totalsteps totaldistance trackerdistance
## 1 1503960366 2016-04-12      13162          8.50            8.50
## 2 1503960366 2016-04-13      10735          6.97            6.97
## 3 1503960366 2016-04-14      10460          6.74            6.74
## 4 1503960366 2016-04-15       9762          6.28            6.28
## 5 1503960366 2016-04-16      12669          8.16            8.16
## 6 1503960366 2016-04-17       9705          6.48            6.48
##   loggedactivitiesdistance veryactivedistance moderatelyactivedistance
## 1                        0               1.88                     0.55
## 2                        0               1.57                     0.69
## 3                        0               2.44                     0.40
## 4                        0               2.14                     1.26
## 5                        0               2.71                     0.41
## 6                        0               3.19                     0.78
##   lightactivedistance sedentaryactivedistance veryactiveminutes
## 1                6.06                       0                25
## 2                4.71                       0                21
## 3                3.91                       0                30
## 4                2.83                       0                29
## 5                5.04                       0                36
## 6                2.51                       0                38
##   fairlyactiveminutes lightlyactiveminutes sedentaryminutes calories
## 1                  13                  328              728     1985
## 2                  19                  217              776     1797
## 3                  11                  181             1218     1776
## 4                  34                  209              726     1745
## 5                  10                  221              773     1863
## 6                  20                  164              539     1728
##   totalsleeprecords totalminutesasleep totaltimeinbed
## 1                 1                327            346
## 2                 2                384            407
## 3                NA                 NA             NA
## 4                 1                412            442
## 5                 2                340            367
## 6                 1                700            712
```

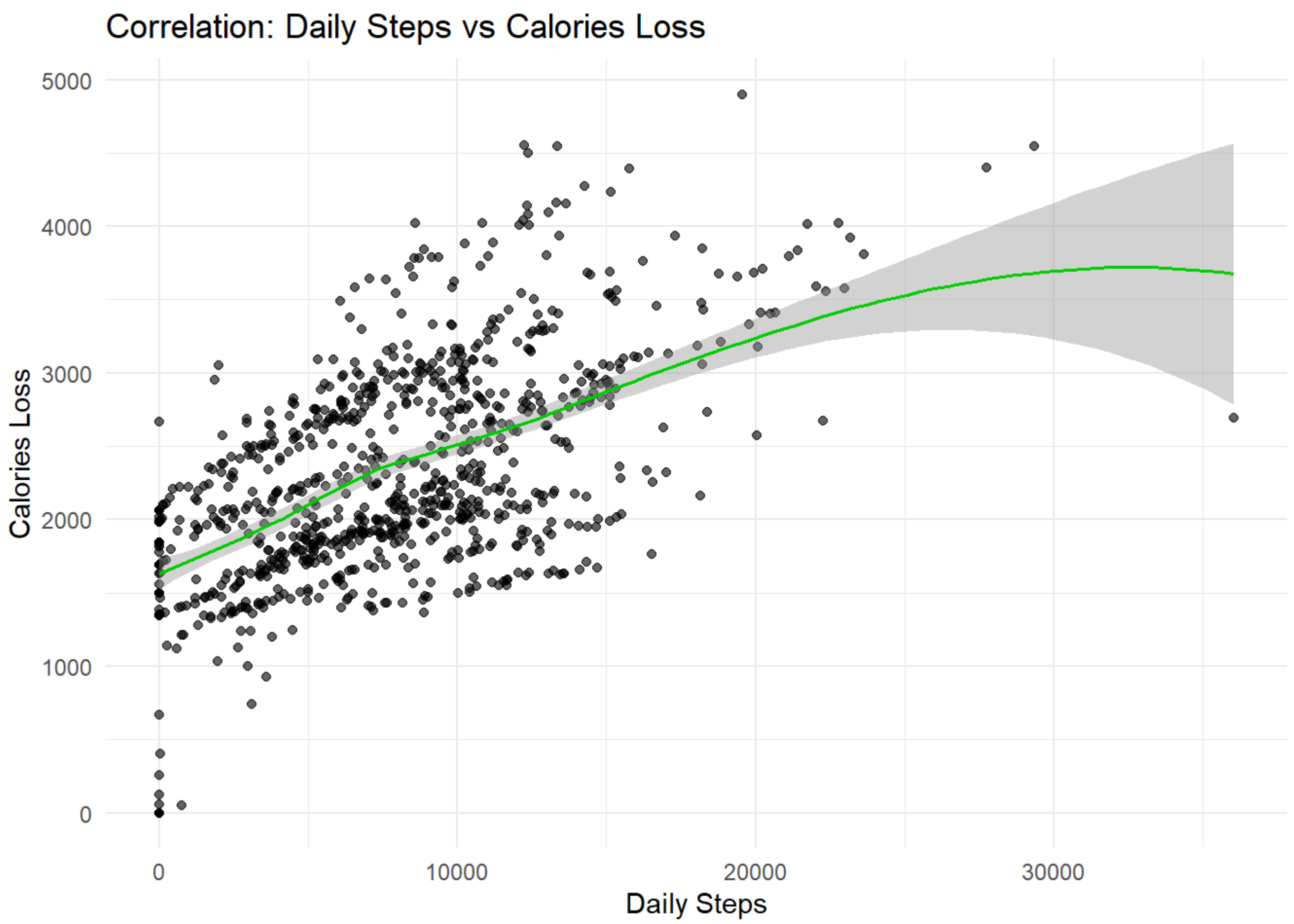
```
activity_sleep %>%
  select(totalsteps, calories, veryactiveminutes, fairlyactiveminutes,
         lightlyactiveminutes, sedentaryminutes, totalsleeprecords,
         totalminutesasleep, totaltimeinbed) %>%
  drop_na() %>%
  summary()
```

```
##    totalsteps       calories    veryactiveminutes fairlyactiveminutes
##  Min.   :   17   Min.   : 257   Min.   :  0.00    Min.   :  0.00
##  1st Qu.: 5189   1st Qu.:1841   1st Qu.:  0.00    1st Qu.:  0.00
##  Median : 8913   Median :2207   Median :  9.00    Median : 11.00
##  Mean   : 8515   Mean   :2389   Mean   : 25.05    Mean   : 17.92
##  3rd Qu.:11370   3rd Qu.:2920   3rd Qu.: 38.00    3rd Qu.: 26.75
##  Max.   :22770   Max.   :4900   Max.   :210.00    Max.   :143.00
##  lightlyactiveminutes sedentaryminutes totalsleeprecords totalminutesasleep
##  Min.   :  2.0        Min.   :   0.0   Min.   :1.00      Min.   : 58.0
##  1st Qu.:158.0        1st Qu.: 631.2   1st Qu.:1.00      1st Qu.:361.0
##  Median :208.0        Median : 717.0   Median :1.00      Median :432.5
##  Mean   :216.5        Mean   : 712.1   Mean   :1.12      Mean   :419.2
##  3rd Qu.:263.0        3rd Qu.: 782.8   3rd Qu.:1.00      3rd Qu.:490.0
##  Max.   :518.0        Max.   :1265.0   Max.   :3.00      Max.   :796.0
##  totaltimeinbed
##  Min.   : 61.0
##  1st Qu.:403.8
##  Median :463.0
##  Mean   :458.5
##  3rd Qu.:526.0
##  Max.   :961.0
```

```
ggplot(data = activity_sleep, aes(x = totalsteps, y = calories))+
  geom_point(alpha = 0.6)+
  geom_smooth(size = 0.6, color = "green3")+
  labs(title = "Correlation: Daily Steps vs Calories Loss",
       x = "Daily Steps", y = "Calories Loss")+
  theme_minimal()
```

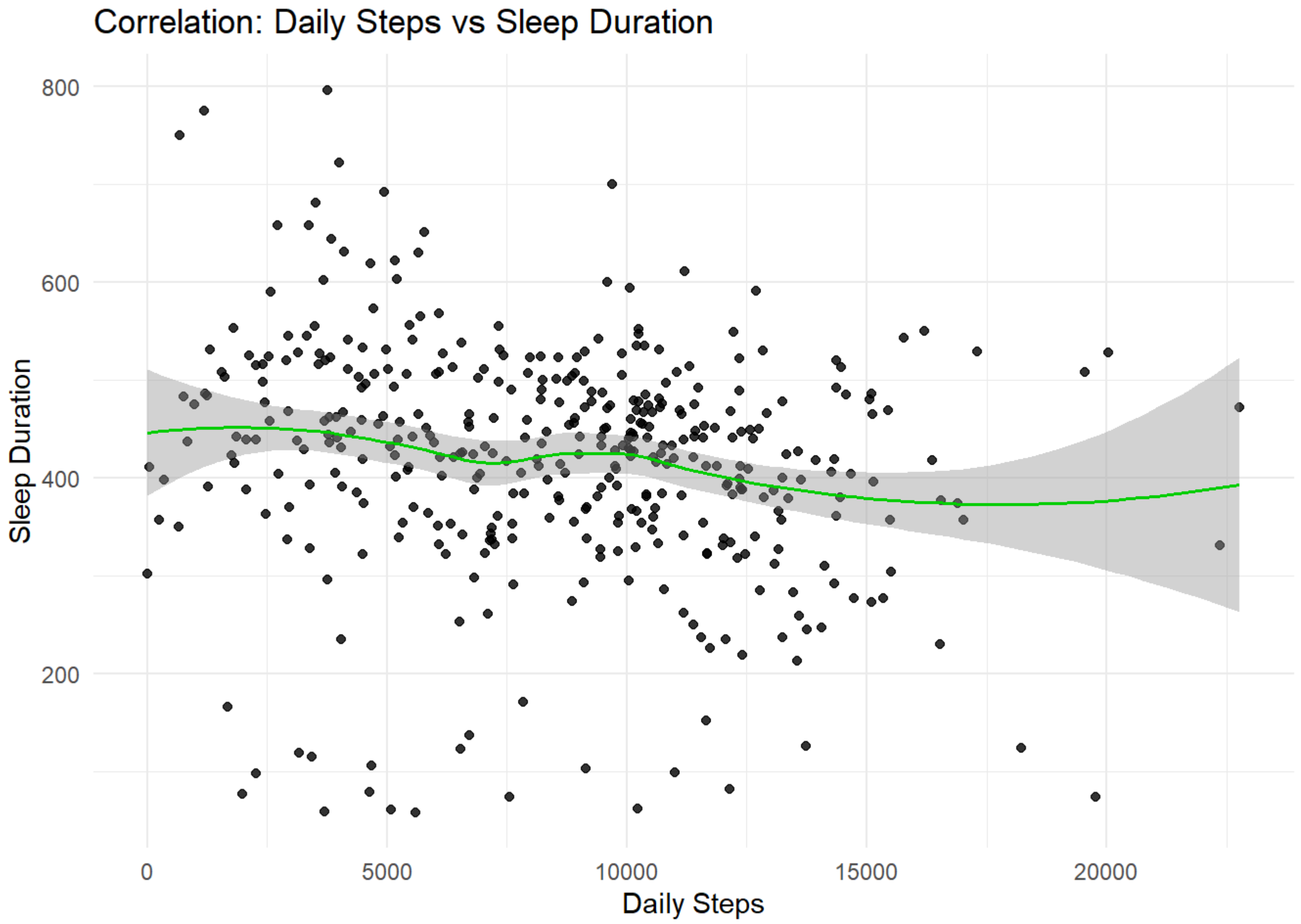
```
## Warning: Using `size` aesthetic for lines was deprecated in ggplot2 3.4.0.
## ℹ Please use `linewidth` instead.
## This warning is displayed once every 8 hours.
## Call `lifecycle::last_lifecycle_warnings()` to see where this warning was
## generated.
```

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



```
ggplot(data = subset(activity_sleep, !is.na(totalminutesasleep)),
                     aes(x = totalsteps, y = totalminutesasleep))+
  geom_point(alpha = 0.8)+
  geom_smooth(size = 0.6, color = "green3")+
  labs(title = "Correlation: Daily Steps vs Sleep Duration",
       x = "Daily Steps", y = "Sleep Duration")+
  theme_minimal()
```

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

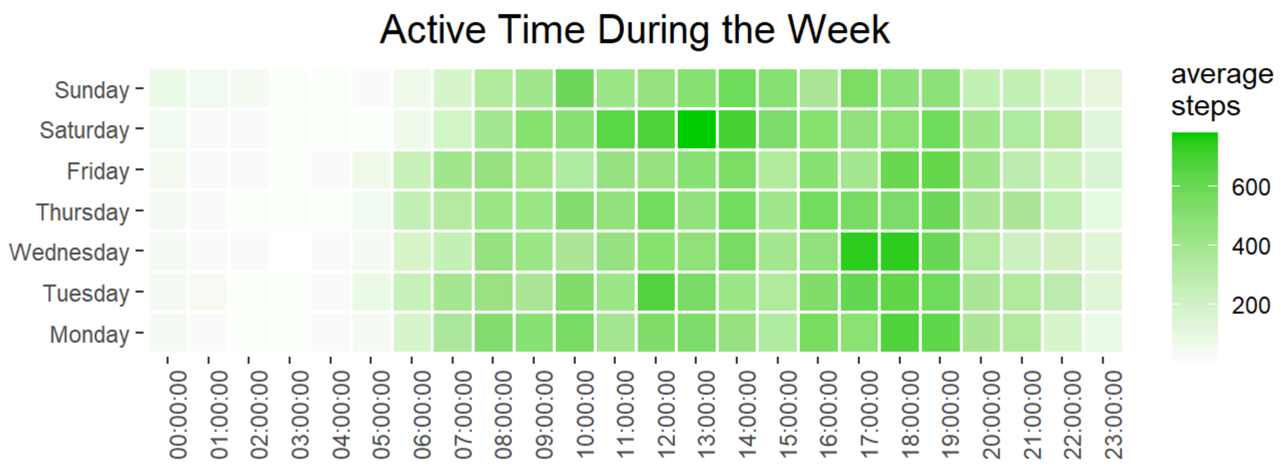


```
h_steps <- h_steps %>%
  separate(date_time, into = c("date", "time"), sep = " ") %>%
  mutate(date = ymd (date))
```

```
h_steps_weekday <- h_steps %>%
  mutate(weekday = weekdays(date)) %>%
  group_by(weekday, time) %>%
  summarize(average_steps = mean(steptotal), .groups = 'drop')

h_steps_weekday$weekday <- ordered(h_steps_weekday$weekday,
                                  levels = c("Monday", "Tuesday",
                                           "Wednesday","Thursday",
                                           "Friday", "Saturday",
                                           "Sunday"))
```

```
ggplot(h_steps_weekday, aes(x= time, y= weekday,
                           fill= average_steps)) +
  theme(axis.text.x = element_text(angle = 90))+
  labs(title = "Active Time During the Week",
       x = " ", y = " ", fill = "average\nsteps")+
  scale_fill_gradient(low = "white", high ="green3")+
  geom_tile(color = "white",lwd =.6,linetype =1)+
  coord_fixed()+
  theme(plot.title = element_text(hjust = 0.5, vjust = 0.8, size = 15),
        panel.background = element_blank())
```



```
daily_average <- activity_sleep %>%
  group_by(id) %>%
  summarize(avg_steps = mean(totalsteps), avg_calories = mean(calories),
            avg_sleep = mean(totalminutesasleep, na.rm = TRUE)) %>%
  mutate(user_type = case_when(
    avg_steps < 5000 ~ "Sedentary",
    avg_steps >= 5000 & avg_steps < 7499 ~ "Lightly active",
    avg_steps >= 7499 & avg_steps < 9999 ~ "Fairly active",
    avg_steps >= 9999 ~ "Very active"
  ))
```

```
user_type_sum <- daily_average %>%
  group_by(user_type) %>%
  summarize(total = n()) %>%
  mutate(total_proportion = total/sum(total))

user_type_sum
```

```
## # A tibble: 4 × 3
##   user_type      total total_proportion
##   <chr>          <int>            <dbl>
## 1 Fairly active      9            0.273
## 2 Lightly active     9            0.273
## 3 Sedentary          8            0.242
## 4 Very active        7            0.212
```

```
days_usage <- activity_sleep %>%
  group_by(id) %>%
  summarize(usage_days = n()) %>%
  mutate(usage_level = case_when(
    usage_days >= 1 & usage_days <= 10 ~ "Low",
    usage_days >= 11 & usage_days <= 20 ~ "Midium",
    usage_days >= 21 & usage_days <= 31 ~ "High",
  ))
```

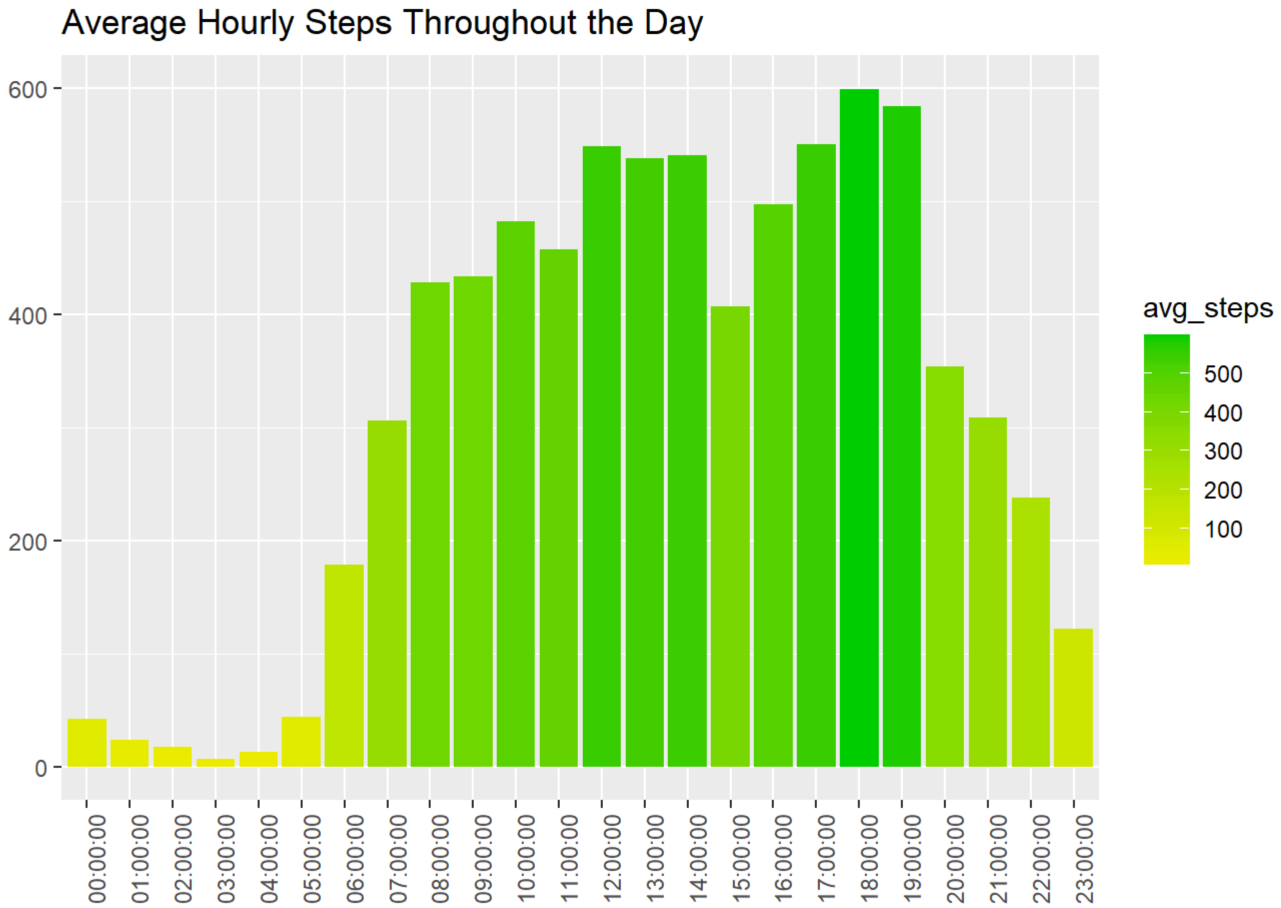
```
usage_level_sum <- days_usage %>%
  group_by(usage_level) %>%
  summarize(user_count = n()) %>%
  mutate(total_proportion = user_count/sum(user_count))

usage_level_sum
```

```
## # A tibble: 3 × 3
##   usage_level user_count total_proportion
##   <chr>            <int>            <dbl>
## 1 High                29           0.879
## 2 Low                  1           0.0303
## 3 Midium               3           0.0909
```

```
avg_h_steps <- h_steps %>%
  group_by(time) %>%
  summarize(avg_steps = mean(steptotal))
```

```
ggplot(data = avg_h_steps)+
  geom_col(mapping = aes(x = time, y = avg_steps, fill = avg_steps))+
  labs(title = "Average Hourly Steps Throughout the Day", x="", y="")+
  scale_fill_gradient(low = "yellow2", high = "green3")+
  theme(axis.text.x = element_text(angle = 90))
```


Average Hourly Steps Throughout the Day
600
400
200
0
00:00:00
01:00:00
02:00:00
03:00:00
04:00:00
05:00:00
06:00:00
07:00:00
08:00:00
09:00:00
10:00:00
11:00:00
12:00:00
13:00:00
14:00:00
15:00:00
16:00:00
17:00:00
18:00:00
19:00:00
20:00:00
21:00:00
22:00:00
23:00:00
avg_steps
500
400
300
200
100