# LSC541 Module 3: Assignment

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## Read in Data

```
getwd()
```

```
[1] "C:/Users/Daniel/Desktop/BioCoding/LSC541/Module 3"
```

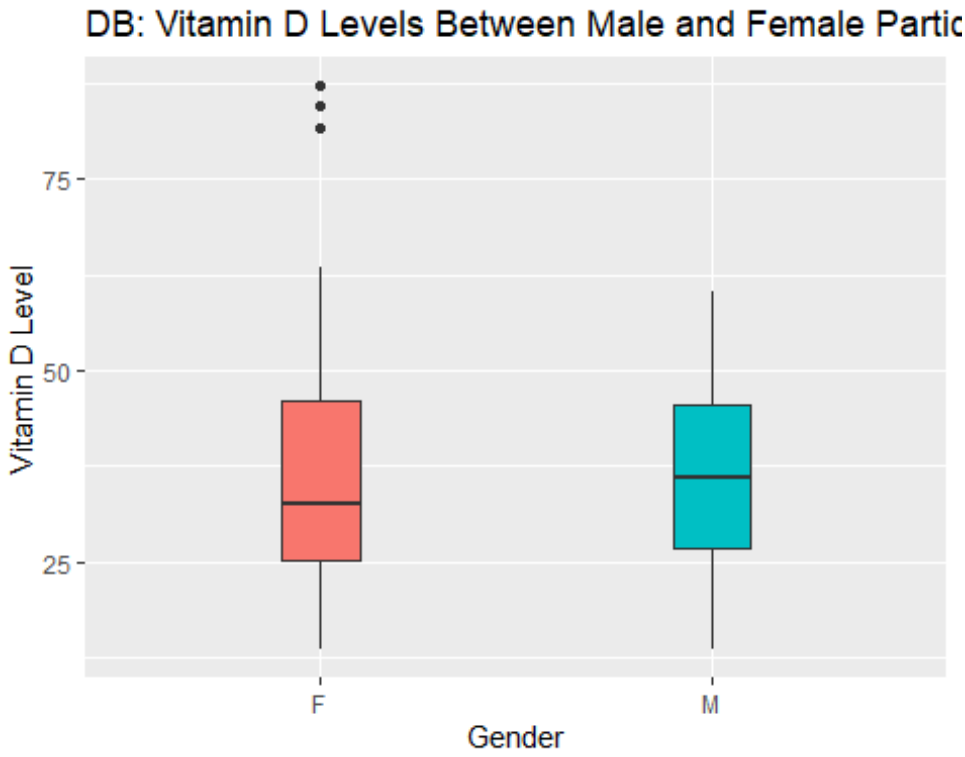
```
setwd("C:/Users/Daniel/Documents")
autism0 <- read.table('C:/Users/Daniel/Downloads/data1_LSC598.txt', header =
T)
autism <- na.omit(autism0)
#Reading in data and omitting a N/A value from the data
```

## Vitamin D Levels (Male vs Female)

```
library(ggplot2)
```

```
Warning: package 'ggplot2' was built under R version 4.3.1
```

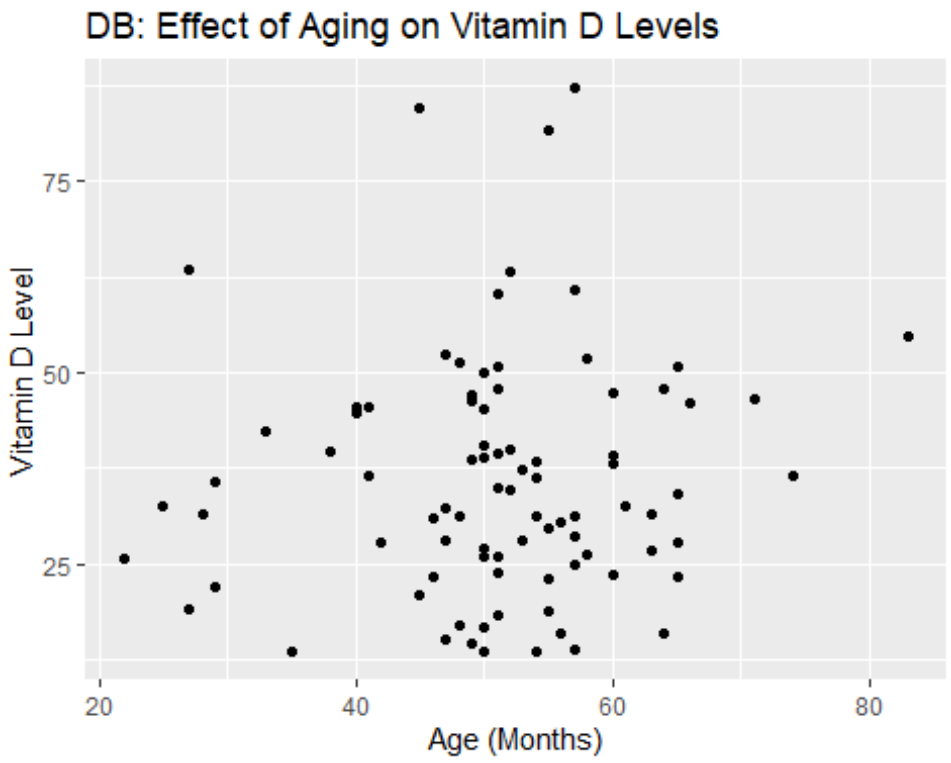
```
ggplot(autism,aes(x=gender,y=vitD_level,fill=gender))+
  geom_boxplot(width=0.2)+
  ylab('Vitamin D Level')+
  xlab('Gender')+
  ggtitle('DB: Vitamin D Levels Between Male and Female Participants')+
  theme(legend.position='none')
```




When visualizing the difference in vitamin D levels between genders, some small differences are observed. It appears that the female distribution of vitamin D levels is left-skewed, with some outliers. This data has greater range than the male data, but has a lower median vitamin D level. The vitamin D level in males however follows an approximately normal distribution with no visible outliers.

## Age vs Vitamin D Level

```
ggplot(autism,aes(x=age_month,y=vitD_level))+
  geom_point()+
  xlab('Age (Months)')+
  ylab('Vitamin D Level')+
  ggtitle('DB: Effect of Aging on Vitamin D Levels')
```




```
cor(autism$age_month,autism$vitD_level)
```

```
[1] 0.08259572
```

When plotting age in months vs the vitamin D level of the participants, there is no strong linear trend observed. This is further proven when calculating then correlation between these two variables to be roughly 0.08. According to this calculation, there is little to no positive correlation between these variables.

## Hypothesis Testing

```
t.test(vitD_level~gender,data=autism)
```

```
    Welch Two Sample t-test

data:  vitD_level by gender
t = 0.10163, df = 58.166, p-value = 0.9194
alternative hypothesis: true difference in means between group F and group M
is not equal to 0
95 percent confidence interval:
 -6.196153  6.859056
sample estimates:
mean in group F mean in group M
       36.05645        35.72500
```

```
#t test for vitamin D levels between genders

t.test(vitD_level~group,data=autism)


    Welch Two Sample t-test

data:  vitD_level by group
t = 0.89425, df = 64.73, p-value = 0.3745
alternative hypothesis: true difference in means between group 0 and group 1
is not equal to 0
95 percent confidence interval:
 -3.896267 10.213690
sample estimates:
mean in group 0 mean in group 1
       37.83714        34.67843

#t test for vitamin D levels between disease groups
```

1. A two-sample t test for vitamin D levels between genders was performed. The null hypothesis of this test was that there was no difference in the vitamin D levels of males and females. The alternative hypothesis is that there is a difference in vitamin D levels between genders. The p-value is >0.05 (0.92), and the 95% confidence interval includes the null hypothesis (-6.2, 6.9). Due to these findings, there is not enough evidence to reject the null hypothesis.

2. A two-sample t test for vitamin D levels between participants with and without autism was performed. The null hypothesis of this test was that there is no difference in vitamin D level of participants with and without autism. The alternative hypothesis is two-tailed, and is that there is a difference between the vitamin D levels of these groups. The p-value is >0.05 (0.37), and the 95% confidence interval includes the null hypothesis (-3.9, 10.2). Due to these findings, there is not enough evidence to reject the null hypothesis.