Question 3

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2025-05-17

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Test whether participants who use melatonin supplements have significantly longer average sleep durations than those who don't.

Hypothesis

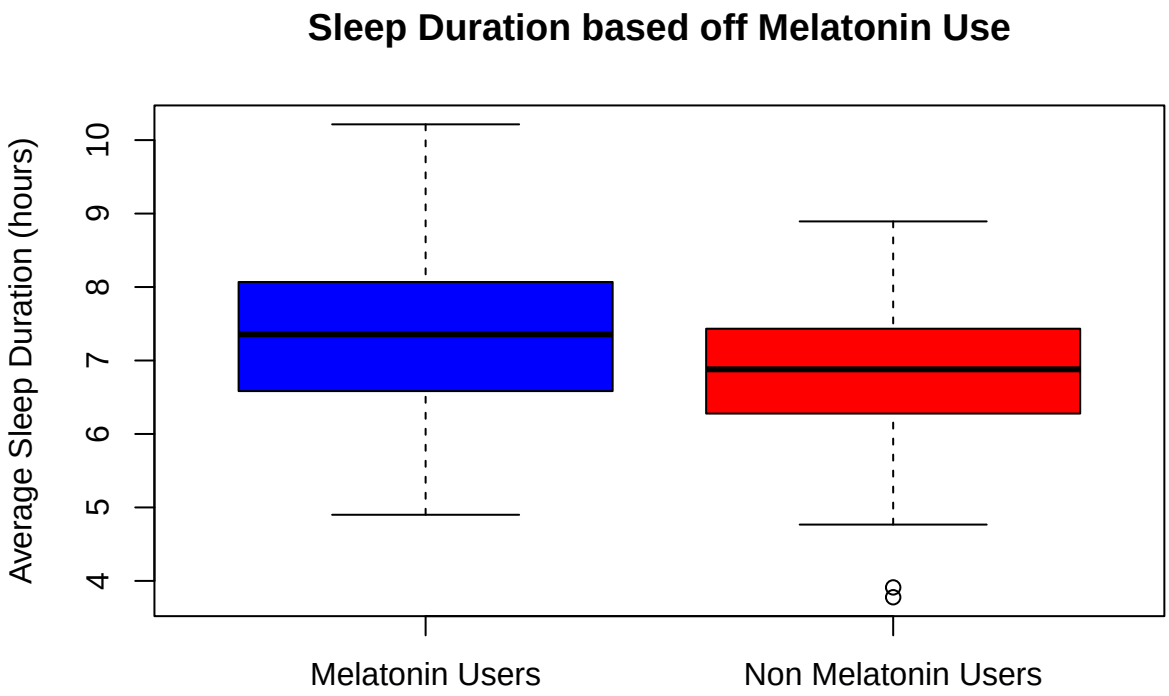
Null Hypothesis H0 - There is not a difference between melatonin users and non melatonin users for average sleep duration.

Alternative Hypothesis H1 - Users that use melatonin have a longer average sleep duration than non melatonin users.

```
SleepCogStudy <- read.csv("Resources/Sleep_Cognition_Study_f1PhaXA.csv")
```

```
usesMelatonin <- SleepCogStudy[SleepCogStudy$MelatoninUse == 1, ]
noMelatonin <- SleepCogStudy[SleepCogStudy$MelatoninUse == 0, ]

boxplot(usesMelatonin$AverageSleepDuration, noMelatonin$AverageSleepDuration,
        names = c("Melatonin Users", "Non Melatonin Users"),
        ylab = "Average Sleep Duration (hours)",
        main = "Sleep Duration based off Melatonin Use",
        col = c("blue", "red"))
```



Expectation

Based from the boxplot, we can predict a statistically significant difference if people who use melatonin show noticeably longer sleep lengths. It then makes sense to assume that melatonin users might sleep longer based on their use of a melatonin.

```
mean(usesMelatonin$AverageSleepDuration)
```

```
## [1] 7.346563
```

```
mean(noMelatonin$AverageSleepDuration)
```

```
## [1] 6.883666
```

```
t.test(usesMelatonin$AverageSleepDuration, noMelatonin$AverageSleepDuration)
```

```
##
##  Welch Two Sample t-test
##
## data:  usesMelatonin$AverageSleepDuration and noMelatonin$AverageSleepDuration
## t = 2.8667, df = 71.686, p-value = 0.005441
## alternative hypothesis: true difference in means is not equal to 0
```

```
## 95 percent confidence interval:
##  0.1409833 0.7848113
## sample estimates:
## mean of x mean of y
##  7.346563  6.883666
```

Conclusion

If the p value less than 0.05 we can reject the null hypothesis and then accept the alternative that melatonin users sleep longer.

If the p value is greater or equal 0.05 we fail to reject the null hypothesis.

Interpreation

As the p value is less that 0.05 we can prove the alternative hypothesis that melatonin users have a longer average sleep duration than non melatonin users.

Was the expectation correct?

Yes it was as the box plot showcased a difference and then hypothesis test statistically confirmed it.

Errors or Warnings

I encountered some issues in regards to how to format t.test function but after looking at the r documentation and a youtube video I was able to correct the syntax errors I had made and get the code working.