First, I will give a short introduction of the subject. The data we analyzed, comes from a bedtime procrastination study. The motivation for this study was the fact that research had shown that sleepiness was very well related to road traffic injuries and health problems like obesity. Bedtime procrastination is defined as voluntary delaying going to bed, despite knowing to be worse off as a result. In the study, the sleep behavior of the participants was monitored for almost two weeks. At the end of the study, the participants filled in a questionnaire about the study.

Inside the study, there was made a difference between two groups, namely an experimental and a control group. The main and only difference between the two groups was that for the experimental group, the lights dimmed automatically at the intended bedtime of the participant. They wanted to investigate if this could influence the bedtime procrastination behavior of people.

In our research, two questions were the point of focus, the first one is

*“Can bedtime procrastination be significantly influenced by experiment?”*

This question is investigated by analyzing the differences between the two groups and looking for significance. Jesse will talk about this later in the presentation.

The second question is:*“How well can bedtime procrastination be predicted?”*

For answering this question, we looked for correlations among the data and we build a regression model to predict the delay time.

In our analysis, we merged the two separate datasets to have multiple data for each participant of the study. We found out that not each participant did fill in the questionnaire, so we had to remove some of the data. Our final dataset consisted of 42 participants with each 11 variables, as you can see over here. Because we will talk about some of these variables in the remaining of the presentation, I will explain them now.

The first one is called ‘delay time’. With this, we mean the difference between the intended bedtime and the real bedtime. If your plan was to go to bed at 11 o’clock and you actually go to bed at 12 o’clock, your delay time is one hour or 3600 seconds.

The second variable is ‘bp\_scale’. This is a Dutch scale to measure the level of bedtime procrastination in a range from 0 to 9. The higher the number, the more a participant delayed their bedtime.

The third worth mentioning variable here is chronotype. This emphasizes if someone is a morning or an evening person on a 7 point scale. The higher, the more someone is considered an evening person.

The last variable is about the sleepiness of the participant. This scale ranges from 0 to 24 and indicates how drowsy someone felt during the day. The higher the number, the higher the drowsy feeling.

We will move on with the results of our analysis.

We made some correlation plots to look for relations between the variables. In this scatter plot, the one between the delay time and bp\_scale strikes out. A pretty well straight line could be drawn through the points, which means there probably is a high correlation between these variables. We calculated the corresponding correlation and it indeed was a strong positive correlation, which means that there is some positive relation between bp\_scale and delay time.

* Participant groups

By comparing the groups (experiment and control), we researched whether bedtime procrastination was affected by the conducted experiment. We didn’t find any significant results applying a Wilcoxon rank sum test to compare the variables in both groups.

But we did see delay time was on the verge of rejecting, which indicates a possible difference to us, as the analysis was performed on a small sample size and could as well be significant in case the experiment is repeated due to randomness. So we took this in mind.

* Histogram of delay time

To give more insight in those differences we plotted the delay time between both groups next to each other, using a histogram. We see two different pictures, but note again that a small change might as well have resulted in similar pictures, as frequencies are pretty low per bin.

* Predicting delay time

In choosing the variables of the prediction model, we tried to use the information we already gained and use some common sense as well. As we found a high linear correlation (+-0.6) between delay time and bp\_scale, it made sense to include this variable in the model. Although we didn’t find a significant difference between the groups, we tried including it in the model as it was on the verge of rejecting. The picture in the next slides gives a little bit more insight into that, which we will discuss in a moment. Also, we tried to use some common sense and included chronotype, was is basically a measure of how much of a morning or evening person you are. [insert relating story]

* Visualization of chronotype and groups

This visualization gives a bit of insight in the groups and chronotype variable we included in the model. What we see is….

* Final model

Our final multiple linear regression model, including group, chronotype and bp\_scale, had an R-squared of 0.475, which doesn’t seem that high to us as the r-squared is a number between 0 and 1. But we can’t really say whether this is good (enough) or bad, all we can do is compare is to compare it to slightly different models and say it is relatively high. It also turned out both chronotype and group added no significant value to the model from the p-values from the test statistic, as the null hypothesis on the parameters being equal to zero wasn’t rejected.

* Discussion

Some points of attention in our analysis are the lack of data, as the tests were performed on a dataset of less then 40 people. (We don’t even know how the participants were chosen and whether this process was completely random. ). So, the results need to be looked at critically, but it might give some good insight of what to expect in future research, and what to pay attention to.

Also, we conducted the multiple regression model based on intuition, not by accepted methodology such as stepwise regression. So this might not even be the best model found in this context. (also, we didn’t put any emphasis in checking the assumptions and we have no idea whether this model would be good (enough) for the possible user, although we didn’t think it scores to high R-squared value. Still, it might be better then guessing for example.

* Conclusion

So, in conclusion: we didn’t find any significance in the tested variables in both groups, meaning we can’t really say this experiment had effect on the participants. Still, there is some uncertainty whether the experiment had effect on delay\_time, as the p-value was on the verge of rejecting. Also, further research might give more insight in this, as well trying a different experiment. Although this small experiment didn’t turn out to have clear effect, doesn’t mean other experiments won’t have.

Also, we found a prediction model with an R-squared of 0.475, which doesn’t seem that high to us, but it is still a prediction. In further research it might be useful to collect data from more users, as well as more variables in order to increase the performance of the model. So, it is hard to say if the model is good enough, but we can say 47.5% of the variance in the independent variable is explained by the dependent variables (definition of R-squared).

Questions?