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The effect of alcohol consumption on bedtime procrastination

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Abstract:

Bedtime procrastination is a self-regulatory problem which correlates with sleep insufficiency. Sleep insufficiency leads to all kinds of health problems like increased chance of cancer and high blood pressure. Excessive alcohol consumption can be a cause of bedtime procrastination. This study tests to what extent alcohol consumption is associated with bedtime procrastination, using data from the LISS Panel. From this dataset representing the Dutch population above age 16, 3283 people were randomly selected. After excluding missing values, the sample size of this study was 2335 respondents,

Firstly, we found an association between no alcohol consumption and bedtime procrastination with a multiple linear regression. Consuming no alcohol is negatively associated with bedtime procrastination, meaning alcohol abstainers generally have less bedtime procrastination than alcohol users. Secondly, I found an association of heavy alcohol consumption and bedtime procrastination. Heavy alcohol consumption (consuming alcohol five or more days in a week) is positively associated with alcohol consumption. People who are heavy alcohol consumers have more bedtime procrastination than people who don't consume alcohol heavily or do not consume alcohol at all. Lastly, the interaction between heavy alcohol consumption and being a student was added to the regression. The results of this interaction term in the regression were not significant, meaning that the relationship between heavy alcohol consumption and bedtime procrastination was not moderated by being a student. This has implications for interventions for people with bedtime procrastination problems.

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1. Introduction

A lot of alcohol is being consumed worldwide. According to the World Health Organization (WHO) the worldwide total consumption in 2018 was 6.2 liters of pure alcohol per person that is 15 years and older. While the worldwide alcohol consumption is high, there are countries with little alcohol consumption. For example, most countries in Africa consume little alcohol (World Health Organization, 2018). But on the contrary, there are countries where the alcohol consumption is high: Almost 8 of 10 adults in the Netherlands has consumed alcohol in 2021 according to a study that was done by the Central Bureau for Statistics (2021). In 2018 the Dutch people consumed more than 8 liters of pure alcohol per person in a year according to the World Health Organization. A small percentage of the Dutch population has heavy and excessive alcohol consumption (8%). While overall alcohol consumption of the Dutch population is decreasing over time, this heavy and excessive alcohol consumption has not changed since 2018 and is hovering around 8 percent (Central Bureau for Statistics, 2021). The relatively persistent excessive alcohol consumption in the Netherlands raises questions about the consequences of this behaviour.

It is generally accepted that alcohol consumption is bad for your health. Alcohol consumption increases the risk of cancer in oral cavity, pharynx, esophagus, liver, colon, rectum, and, in women, breast (Bofetta & Hashibe, 2006). Other long-term health risks are high blood pressure and diseases in the heart and liver (Rehm et al., 2010). There are also short-term health risks like injuries, aggression, violence, and risky behaviour (World Health Organization, 2018). These short-term risks are mostly behavioural problems. The more recent studies about alcohol consumption focus increasingly on behavioural problems. Specifically, alcohol is known to decrease self-regulation, which is a behavioural problem. Self-regulation is a broad term describing the ability to plan and manage your behaviour, that could be expressed in anything from eating healthy food to going to the gym.

One problem that people with low self-regulation often have, is bedtime procrastination. Bedtime procrastination is failing to go to bed on the time you planned to sleep, without someone or something preventing you. Bedtime procrastination could lead to insufficient sleep (Kroese et al. 2014a): going to bed later does not mean also waking up later. If you

have to go to school or to work and you plan to sleep 7 hours before you wake up, but you go later to bed then planned, this will probably cause insufficient sleep. That is why bedtime procrastination is linked to sleep problems. Sleeping problems have been rising in the recent years. A study done by Krueger and Friedman (2009) showed that 28.3% of adults sleep 6 hours or less in the US. Not sleeping enough can lead to negative health effects like memory loss and, concentration problems (Ram et al., 2010). It can also lead to daytime weakness, tiredness and, sluggishness (Chattu et al., 2018). In addition, insufficient sleep reduces workplace productivity and therefore is costly for the employers (Hafner et al., 2017). Hafner et al. (2017) also developed a macro-economic model to estimate the economic costs. They found a 1 to 3 percent decrease in the GDP due to insufficient sleep, caused by absenteeism, and reduced performance a work. Employees with sleep deprivation are also more likely to die, and sleep deprivation hinders individuals' skill development. That is why we will explore one form of self-regulation in this paper: bedtime procrastination.

Since a correlation has been shown between self-regulation and alcohol consumption (Hustad et al., 2009), where lower levels of self-regulation are related to higher levels of alcohol consumption, it is expected that alcohol consumption is related to bedtime procrastination as well. A previous relationship between sleep time and alcohol consumption has already been found (Lantman et al. 2017). This is relevant to business and society, because understanding the association between alcohol consumption and bedtime procrastination can help employers as well as employees to optimize work performance by encouraging them to change their alcohol consumption behaviour.

This study contributes to the literature in several ways. Firstly, this study contributes to other studies about bedtime procrastination by investigating the link with alcohol consumption, which has not yet been done. Secondly, this study contributes to self-regulatory research by looking at bedtime procrastination as a self-control problem affected by alcohol consumption. Bedtime procrastination is a relatively new subject, and it is not researched enough. It contributes to the bedtime procrastination research by showing a possible new factor which affects bedtime procrastination. Hence, the research question of this paper is to what extent alcohol consumption relates to bedtime procrastination.

2. Theoretical framework

Bedtime procrastination is an under researched subject and data, such as datasets which include sleeping hours on an individual level, is not widely available. That is why I will also consider research on self-regulation and self-control instead of only focusing on bedtime procrastination. Self-control is about suppressing the impulses and self-regulation is about reducing the frequency and intensity of impulse. Kroese at al. (2014b) did research about bedtime procrastination and sleep insufficiency. They collected data by doing a one-time questionnaire and a 7-day diary. They found after doing a multiple linear regression that bedtime procrastination was positively associated to sleep insufficiency. They also found a negative association between self-control and bedtime procrastination.

A study about alcohol and self-control among low-income workers showed that an increase in sobriety increased savings (Schilbach, 2019). They did not find an effect of alcohol on productivity or earnings. The study was done in India and the workers were rikshaw drivers and this would not be externally valid for western countries. Sobriety increased saving so it increased a form of self-regulation. This could mean that abstaining from alcohol could potentially reduce bedtime procrastination. This motivates the first hypothesis of this paper. The first hypothesis is that the participants who do not consume alcohol have lower bedtime procrastination.

Hustad et al. (2019) did a study on self-regulation and alcohol consumption. The participants of this study were 170 heavy drinking college students. These participants completed self-report questionnaires about their drinking behaviour at 1-, 6- and 12- month assessment. For the self-regulation, a Short Self-Regulation Questionnaire (SSRQ) was used with a 5-point Likert scale. They found a significant association between self-regulation and alcohol consumption. Higher amounts of alcohol consumption were correlated with lower levels of self-regulation.

It appears that self-regulatory mechanisms are important for both the causes and the consequences of alcohol use according to Hull and Slone (2004). Increased alcohol use is linked to both self-control failures and self-regulatory failures. Because bedtime procrastination is also a self-regulatory failure, increased alcohol use could also be

correlated with bedtime procrastination. I assume that higher levels of alcohol consumption indicate higher self-regulatory problems. The second hypothesis of this study is therefore that if the participants are heavy alcohol consumers, then they have higher bedtime procrastination.

Based on the literature, it is expected that people who have higher alcohol consumption have higher bedtime procrastination, and therefore sleep less, because their alarm goes off at the same time. However, there is also literature indicating that higher alcohol consumption is associated with increased sleep time, possibly due to an extended hangover duration (Lantman et al. 2017). This shows that the effects of alcohol on sleep are complicated and not straightforward. It is possible that the occupation of the alcohol consumer is instrumental in understanding the effects of alcohol on sleep. The study by Lantman et al. (2017), for example, was done among Dutch students who recently had a hangover. The students have probably a different alcohol consuming behaviour and sleeping behaviour than the general population. Carpenter and Dobkin (2009) found large increases in alcohol consumption at age 21. Another important difference is that students often have different priorities than working people: they are in a stage of their life where social interaction and self-exploration are important factors (Cantor et al., 2002). Students often prioritize social situation when they go out with college friends. When they are in those social situations, alcohol is often a substance used to facilitate socializing and to increase "fun". For those reasons, students are characterized as consuming heavy amounts of alcohol (Borsari et al., 2007).

In addition, the consequences of alcohol consumption are different for students compared to employees. Students usually do not have a full-time job and therefore do not need to go to work early. They have to attend their lectures, but they can ask their friends for notes or attend the lecture later. There are also possibilities to watch the lectures later online. The consequences of being late or skipping is bigger for non-students who have a full-time job. This makes it easier for the students to engage in bedtime procrastination, as well as making it easier to engage in heavy drinking. The third hypothesis of this study is therefore that the effect of alcohol consumption on bedtime procrastination is higher if the participant is a student.

3. Data & Methodology

Database

The data on alcohol consumption and on bedtime procrastination was collected from the LISS (Longitudinal Internet studies for the Social Sciences) panel. LISS Panel is a platform that collects Dutch panel data every year from monthly internet surveys and provides researchers of universities and public organizations data for research. The data that LISS panel provides, consists of questions asked about different daily things like their hours worked or alcohol consumption. LISS Panel consists of 5000 households every year, which is around 7500 individuals, who are over the age of 16. The panel is based on a general probability sample of households collected from Statistics Netherlands' population record. This makes the sample representative for the Dutch population. Households without prior Internet connection are given a computer and access to high-speed Internet. This solves the bias of not having access to fill in the survey.

This data used in this paper was part of a one-time survey collected by Kroese, Adriaanse, Evers and De Ridder in 2013 through LISS Panel. People that took nightshifts at their work and people that got treated for sleeping problems got removed from the data because these factors may have an impact on sleep insufficiency. The collected data consisted of two parts. The first part was from a baseline questionnaire with a total of 2637 participants. This survey questioned the participants about experienced sleep insufficiency, self-regulation, general procrastination, and bedtime procrastination. The second part of the data was collected through a 7-day bedtime diary with a total of 2106 participants. This diary measured the sleep behaviour by asking the participants at what time they wanted, and at what time they actually went to bed. The study by Kroese at al. (2014b) is about insufficient sleep from a self-regulation perspective. They found that self-control was negatively correlated with experiencing insufficient sleep.

Research Population

The research population of the dataset used in this study is the Dutch population. LISS Panel collects data based on a general probability sample. The participants are over the age of 16. This sample is collected from Statistics Netherlands' population record, which makes the sample representative of the Dutch population over the age of 16. The data on bedtime procrastination was collected through a one-time collected dataset. Half of the panel members were randomly selected to fill in the questionnaire. Out of the 3283 randomly selected members 2637 filled in the baseline bedtime procrastination questionnaire in March 2013. Datasets about the background and the health of the participants are from the regular questionnaire that the LISS Panel collects from their members. The background dataset was collected in March 2013 and the Health dataset collected in November 2013. The background dataset is from the same month as the bedtime procrastination dataset. The health dataset is not from the same month, but it is from the same year. These datasets were needed for the control variables and the information on alcohol consumption. The participants of both datasets are from the LISS Panel members, so the datasets were merged together. This was done through the statistical software STATA. After merging and removing the missing data the dataset contained 2335 observations. These observations will be analyzed with the software STATA.

Regressions & Variables

To evaluate if there is a relation between no alcohol consumption and bedtime procrastination, a linear regression was used. The multiple regression analysis was applied to answer the three hypotheses and the main question of this paper. We used the first regression to test the relationship between no alcohol consumption and bedtime procrastination.

$$(1)$$

$$\text{Bedtime procrastination}_i = \beta_0 + \beta_1 No\ Alcohol\ Consumption_i + \beta_2 Age_i + \beta_3 Nationality_i + \beta_4 Gender_i + \beta_5 Student_i + \beta_6 Marital\ Status_i + \beta_7 Children_i + \beta_8 Health_i + \beta_9 Education_i + \varepsilon_i$$

The second model was used to test the second hypothesis. This regression helps us evaluate the relationship between heavy alcohol consumption and bedtime procrastination.

(2)

$$\text{Bedtime procrastination}_i = \beta_0 + \beta_1 Heavy\ Alcohol\ Consumption_i + \beta_2 Age_i + \beta_3 Nationality_i + \beta_4 Gender_i + \beta_5 Student_i + \beta_6 Marital\ Status_i + \beta_7 Children_i + \beta_8 Health_i + \beta_9 Education_i + \varepsilon_i$$

The interaction term between heavy alcohol consumption and student was added to the first regression. This is the third regression and was used to evaluate the third hypothesis to see if the effect of alcohol consumption on bedtime procrastination is higher for students. The regression is:

(3)

$$\text{Bedtime procrastination}_i = \beta_0 + \beta_1 Heavy\ Alcohol\ Consumption_i + \beta_2 Age_i + \beta_3 Nationality_i + \beta_4 Gender_i + \beta_5 Student_i + \beta_6 Marital\ Status_i + \beta_7 Children_i + \beta_8 Health_i + \beta_9 Education_i + \beta_{10} Heavy\ Alcohol\ consumption_i * Student_i + \varepsilon_i$$

Bedtime procrastination is the dependent variable of the regression used in this study. Bedtime procrastination is measured by Kroese (2014b) as nine questions about bedtime procrastinating. Sample items are "When it is time to go to bed, I often am still doing other things" and "I easily get distracted by other things when I actually had wanted to go to bed". These questions were answered on a 5-point Likert scale, with 1 being almost never to 5 being almost always. Some of the questions are reverse coded so that the score 1 always indicates a lower procrastination behaviour (Appendix A). With this it is possible to take the average of the questions and use it as an indicator for bedtime procrastination behaviour.

Degree of alcohol consumption is the independent variable in this study. The data collected on alcohol consumption was not in the same one-time collected dataset about bedtime procrastination. The same participants did a survey about their health, which was collected by the LISS Panel. This survey contains questions about the consumption of alcohol. We will use the question about how often the respondents consumed a drink containing alcohol over the last 12 months, which measures alcohol consumption in eight categories (Appendix

B), of which the levels are not linearly increasing. This health dataset will be merged together with the dataset from Kroese (2014b).

Degree of alcohol consumption is split into two dummy variables: no alcohol, and heavy alcohol consumption. People who consume alcohol five times or more a week are considered High-frequency consumers (Wilsnack et al., 2009). This is also the threshold used to create the dummy and measure heavy alcohol consumption. The dummy is 1 if the participants heavy drinkers and 0 if they are not heavy drinkers. For people who do not consume alcohol is also a dummy created with 1 if they abstain from alcohol and 0 if they have consumed alcohol in the past 12 months.

For the third model we used an interaction term between being a student and alcohol consumption. Being a student is added in the model as a binary variable with the value 1 if the primary occupation of the participant is attending school or is studying, and the variable is 0 if he is not. This variable is also added as a control variable in the other models.

In this study we use control variables to improve the internal validity. I control for age, nationality, gender, being a student, marital status, number of children, self-reported health, and education. These variables impact both alcohol consumption and bedtime procrastination. We control for age because alcohol consumption declines as individuals grow older, they become more mature and more social responsibilities (Wilsnack et al., 2009). Gender is a control variable, because females generally drink less alcohol (Wilsnack et al., 2009), which means gender can explain variation in the model. Gender also consisted of a third option 'other', but none of the participants were in that category. Therefore, gender is a binary variable that has the value of 1 when the participant is a female and 0 if the participant is a male.

Nationality is a binary variable with the value of 1 if the participant has a Dutch background. The value of this variable is 0 in all other cases. The drinking behaviour is different for other cultures and countries. Marital status is binary variable that has the value of 1 if the participant is married and 0 if that is not the case. The number of children is an ordinal variable that has the same value as the number of living-at-home children in the household. Children can disrupt bedtime for other people living in the house. Health is an ordinal self-reported variable that has the values from 1 to 5. The higher the values the better the

participants feel about their own health. Health affects your choice to drink alcohol as it could make your health worse. Due to health problems the bedtime could be disrupted and procrastinated. The last control variable is the highest level of education. It consists of six categories, which are added as dummies in the regressions. The categories are primary school, VMBO (intermediate secondary education), HAVO/VMBO (higher secondary education/preparatory university education), MBO (intermediate vocational education), HBO (higher vocational education) and university. The choices people make about bedtime procrastination and alcohol consumption differs due to education and knowledge difference.

Descriptive Statistics

Table 1 shows us the descriptive statistics of all the non-binary variables used in the regressions. We can see that the number of observations is for every variable is the same, because all the missing variables were removed from the dataset. The minimum of the variable *Age* is 16 and the Maximum is 93, which corresponds with the youngest and oldest participant(s). Table 1 shows that the maximum number of children living in a household is six. The mean of the variable *No Alcohol* is 0.12, this means that 12% of the participants in this dataset had not consumed any alcohol in the last 12 months. In this dataset 22.9% of the participants were heavy alcohol consumers. The participants were for 53.7% females and 57.3% of the participants were married. Nationality consisted 85% out of people with a Dutch background. There are 190 students (8.1%) in this dataset. The highest education of most people is VMBO with 25.8% in this dataset.

Table 1: Descriptive Statistics

Variable	Obs.	Mean	Std. dev.	Min	Max
Bedtime Procrastination	2,335	2.732	.850	1	5
Age	2,335	51.313	17.438	16	93
Children	2,335	.798	1.122	0	6
Health	2,335	3.079	.766	1	5

Notes: Table 1 shows the average statistics of the variables above, which are used in the regressions in this study. It shows the observations, the mean, the standard deviation, and the minimum- and maximum of the variables.

If the regression is controlled for all the relevant variables, it can be interpretated as causal. This means that the correlation between the interest variable and the error-term should be 0. This is known as the Conditional Independence Assumption (CIA). It is hardly ever possible to control for all the relevant variables because of the omitted variable bias. Even if all the relevant variables are taken in the model, it is not always possible to measure those variables. The assumption that random sampling occurred holds because the sample was randomly taken to be identical to the Dutch population. There are no big outliers in this study as most of the variables are dummies or a scale. The variable age also does not have outliers according to figure 1 in the appendix. The linearity assumption holds as the independent variables are dummies and can be interpreted as linear between the two points of the dummy variables.

4. Results

This study was conducted to determine to what extent alcohol consumption was related to bedtime procrastination. First, we are going to test the first hypothesis. The first hypothesis was that the participants do not consume alcohol have a higher bedtime procrastination score. The depended variable is a 1-5 scale of bedtime procrastination, and the independent variable is a dummy variable that indicates if the participants do not drink alcohol. To test this hypothesis, multiple regression analysis was used.

From the regression results in table 2 it shows that 9.3% of the variance in bedtime procrastination can be accounted for by this model. It turns out that abstaining from alcohol consumption is significantly associated at a 1% level with the bedtime procrastination score. The coefficient is negative, so the people who had not consumed any alcohol in the past 12 months had on average 0.212 lower procrastination score compared to someone who consumes alcohol. Looking at the control variables, the number of children living at home positively predicts Bedtime Procrastination Score. The variables about age, having a Dutch background, being married and self-reported health are negatively associated with Bedtime Procrastination.

In testing the first hypothesis, "the abstaining of alcohol consumption predicts bedtime procrastination", results of a linear regression indicated that no alcohol use significantly negatively predicted bedtime procrastination (β =-0.212, p<0.001). This means that people who were alcohol abstainers, overall reported lower bedtime procrastination than people who were alcohol consumers. Therefore, we accept the first hypothesis.

Table 2: Linear regression results where Bedtime Procrastination Score is related to multiple independent variables (model 1)

Variable	β	SE	t	p-value
No Alcohol Consumption	-0.212***	0.053	-4.01	<.001
Age	-0.010***	0.001	-7.13	<.001
Nationality	-0.082*	0.049	-1.67	.094
Gender	0.019	0.034	0.56	.575
Being a student	0.087	0.080	1.09	.277
Marital status	-0.091**	0.038	-2.38	.017
Number of children	0.050***	0.018	2.79	.005
Self-reported health	-0.126***	0.023	-5.52	<.001
Level of education				
Primary (reference)				
VMBO	-0.036	0.064	-0.57	.570
HAVO or VWO	0.141*	0.073	1.93	.054
MBO	0.030	0.067	0.45	.656
HBO	0.075	0.067	1.13	.259
University	0.209***	0.080	2.61	.009
Constant	3.669***	0.133	27.53	<.001

Notes: R^2_{adj} = 0.088 (p=0.000). This table shows us the coefficients, standard errors, the t value, and the p value for the first model. The stars behind the coefficients β refer to the significance level (*p<0.10, **p<0.05, ***p<0.01).

The second hypothesis of this study is that the heavy alcohol consumers have a higher bedtime procrastination score. To test this hypothesis, we used the multiple regression analysis. The left regression in table 3 is the second model of this study. This model was used to answer this hypothesis. According to table 3 8.8% of the variance in bedtime procrastination can be accounted for by this model. Heavy alcohol consumption is significant at a 5% level, and the coefficient is positive. People who are heavy alcohol consumers have on average 0.087 higher bedtime procrastination score compared to people who are not heavy alcohol consumers. The number of children living at home is positively correlated with bedtime procrastination. The variables that correlate negatively

with Bedtime Procrastination are age, being married, having a Dutch background and self-reported health.

Table 3: Linear regression results for the relationship between bedtime procrastination and multiple independent variables with and without the interaction term (model 2 & 3)

Variable	β	SE	t	P-value	β	SE	t	P-value
		Model 2				**Model 3**		
Heavy Alcohol consumption	0.087**	0.042	2.04	.041	0.087**	0.043	2.02	.043
Age	-0.010***	0.001	-7.26	<.001	-0.010***	0.001	-7.25	<.001
Nationality	-0.063	0.049	-1.29	.199	-0.063	0.049	-1.29	.199
Gender	0.015	0.034	0.43	.666	0.015	0.034	0.43	.666
Being a student	0.090	0.080	1.12	.262	0.091	0.081	1.11	.267
Marital status	-0.098**	0.039	-2.56	.010	-0.098**	0.039	-2.56	.011
Number of children	0.045**	0.018	2.53	.012	0.045**	0.018	2.53	.012
Self-reported health	-0.120***	0.023	-5.25	<.001	-0.120***	0.023	-5.25	<.001
Level of education								
Primary (reference)								
VMBO	-0.035	0.064	-0.55	.580	-0.035	0.064	-0.55	.580
HAVO or VWO	0.147**	0.073	2.00	.045	0.147**	0.073	2.00	.045
MBO	0.037	0.067	0.56	.575	0.037	0.067	0.56	.575
HBO	0.090	0.067	1.35	.178	0.090	0.067	1.35	.178
University	0.219***	0.080	2.73	.006	0.219***	0.080	2.73	.006
Being a student*Heavy Alcohol Consumption					-0.007	0.267	-0.03	.978
Constant	3.617***	0.133	27.24	<.001	3.618***	0.133	27.23	<.001

Notes: R^2_{adj} = 0.082 (p=0.000) for both models. This table shows us the coefficients, standard errors, the t value, and the p value for the second and the third model. The left regression is without the interaction term between Student and Heavy Alcohol. The stars behind the β refer to the significance level (*p<0.10, **p<0.05, ***p<0.01).

In testing the second hypothesis, "heavy alcohol consumption predicts bedtime procrastination", results of a linear regression indicated that heavy alcohol consumption significantly positively predicted bedtime procrastination (β =0.087, p=0.041). This means that people who were alcohol abstainers, overall reported lower bedtime procrastination than people who were alcohol consumers. Therefore, we accept the second hypothesis.

To answer the third and final hypothesis of this paper we will be using the second regression in table 3. This regression is the same as in hypothesis 2 but with an added interaction term between student and heavy alcohol consumption. The third hypothesis was that the effect of alcohol consumption on bedtime procrastination is higher if the participant is a student. According to the second regression of table 3 heavy alcohol consumption and Children are both positively correlated with bedtime procrastination. The variables about age, being married and self-reported Health are negatively associated with bedtime procrastination. The coefficient for participants who are not students is 0.043 and for participants who are students is 0.036, because the coefficient of the interaction between being a student and alcohol consumption is -0.007. This interaction term is not significant.

In testing the third hypothesis, "the effect of alcohol consumption on bedtime procrastination is higher if the participant is a student.", results of a linear regression indicated lower effect of alcohol consumption on bedtime procrastination. That is because the coefficient was negative for the interaction term. The association was not significant, which means that the effect of alcohol consumption on bedtime procrastination for students was not significantly different than for people who are not students. Therefore, we cannot accept the third hypothesis.

5. Discussion & Conclusion

In this paper, we studied to what extent alcohol consumption relates to bedtime procrastination. To answer this question three hypotheses were tested. The data we used in this paper was collected from the LISS Panel. Bedtime procrastination was measured using a questionnaire on a 5-point Likert scale.

For the first hypothesis, we expected that people who do not consume alcohol have a lower bedtime procrastination score. The results showed a significant difference in the bedtime procrastination score between people who do and do not consume alcohol. Participants who did not consume alcohol in the past 12 months had a lower score. The second hypothesis was that heavy alcohol consumers have a higher bedtime procrastination score. We found a significant positive association between bedtime procrastination and the people who were heavy alcohol consumers. For the third and last hypothesis, we expected that the association between alcohol consumption and bedtime procrastination would be higher for students than participants who were not students. We found that the effect was really small, negative, and also not significant. According to this research alcohol relates to bedtime procrastination positively when alcohol is consumed heavily. Alcohol associates negatively with bedtime procrastination when alcohol is not consumed. Both results suggest that consuming alcohol is positively associated with bedtime procrastination.

The results of the first hypothesis were in line with the expectations. As bedtime procrastination is a self-regulatory problem and alcohol consumption was negatively correlated with self-regulation (Hustad et al., 2009), it was expected that consuming no alcohol would have a lower bedtime procrastination. The same was found in the second hypothesis; if the participants are heavy alcohol consumers, then they have higher bedtime procrastination. The third hypothesis did not match our expectation because the coefficient was negative and not significant. Lantman et al. found that students who consume more alcohol also slept more. Alcohol can make you sleepy, this could be the reason that students sometimes go to bed on time or even early. The reasoning for the third hypothesis also suggested that alcohol itself was not the reason the students procrastinate, but the other variables that come with it, which can lead to a biased result. Another reasoning why there was no significant positive association could be that there were very little number of

students who were heavy alcohol drinkers. According to table 4 in the appendix there were 524 out of the 2145 who are not students were heavy alcohol consumers (24.4%). There were 10 heavy drinking students out of 190 students (5.3%). This is interesting as it was expected that for students there would be a higher percentage of heavy alcohol consumption than people who are not students.

In this study only heavy and no consumption is analyzed, which is a limitation of this study. To make a linear regression with the consumption of alcohol in number of glasses was not possible using the data source so dummy variables were made. Therefore, we cannot conclude that the correlation between alcohol consumption and bedtime procrastination is linear. Another limitation of this study is that bedtime procrastination and bedtime procrastination could have reverse causality, because going later to bed than intended can also make you consume alcohol. Reverse causality causes bias, and we cannot assume the Zero Conditional Mean because of that. This problem could be solved by using an instrumental variable for alcohol consumption.

An association between alcohol consumption and bedtime procrastination was found in this study. This could help people who want to reduce their bedtime procrastination. They could be given the advice to consume no or less alcohol. While there is no causal interpretation in this study, there could still be underlying variables that come with alcohol consumption which can cause or are also associated with bedtime procrastination. This intervention can also increase interest in the field of bedtime procrastination, which can further help the people who want to reduce bedtime procrastination.

We recommend for future research to measure the amount of alcohol consumption with the number of glasses they drink in a week. This could make a linear regression explanation possible, and no dummy variable have to be used. Also doing an experiment by assigning random people to how much alcohol they need to drink could give better results, but that could be unethical to do. To solve the problem of unethical experiments, an instrumental variable can be used.

It was interesting to see that the variable Health was significant on a 1% level in all three regressions. Future research on health and bedtime procrastination can give us insight on another problem that is associated or perhaps causes bedtime procrastination. Having

health problems can cause you not to sleep on time. For example, having trouble with breathing and have to take some time to recover. Health is not a problem that is easily fixable if people are looking to procrastinate their bedtime less. This can give us some insights on the problems and it's possible to look at different kinds of health problems, which can give us an explanation about bedtime procrastination and perhaps sleep deficiency.

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Appendix

Appendix A: Questions bedtime procrastination scale

1. It happens that I lie in bed later than I had intended.

2. If I have to get up early, I make sure I go to bed on time. (Reverse coded)

3. When it is time to turn off the lights, I do so immediately. (Reverse coded)

4. When it is time to go to bed, I often am still doing other things.

5. I easily get distracted by other things when I actually had wanted to go to bed.

6. In my opinion, I do not lie in bed on time.

7. I have a fixed bedtime to which I keep. (Reverse coded)

8. I want to go to bed on time, but I cannot do it.

9. In the evening, I can easily stop doing other activities to go to bed. (Reverse coded)

Appendix B: Alcohol consumption

1. almost every day

2. five or six days per week

3. three or four days per week

4. once or twice a week

5. once or twice a month

6. once every two months

7. once or twice a year

8. not at all over the last 12 months
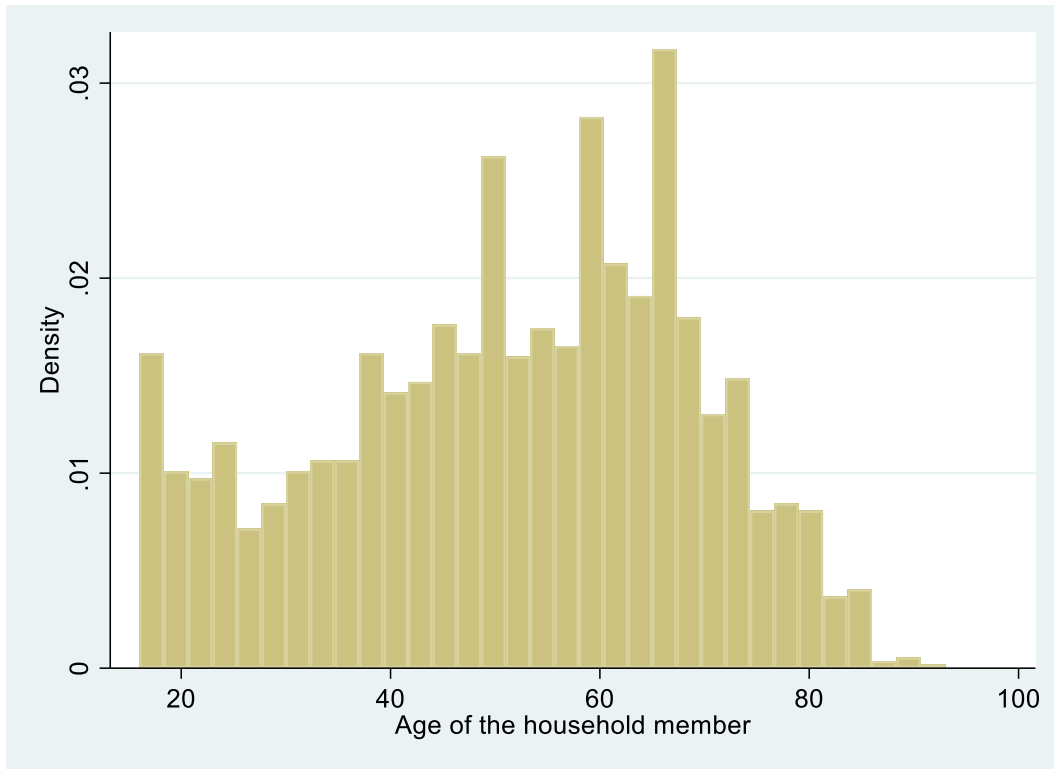
Figure 1: Histogram on age of the participants

Table 4: tabulation between being a student and heavy alcohol consumption

| Student | Heavy Alcohol | | |
	0	1	Total
0	1,621	524	2,145
1	180	10	190
Total	1,801	534	2335