ERASMUS UNIVERSITY ROTTERDAM
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Title thesis: Can you change the injunctive norms and predicted consumption regarding alcohol under students in the Netherlands by nudging them in the right direction?

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ABSTRACT

Aims: This study aimed to assess the injunctive norms under students in the Netherlands and the effectiveness of nudging strategies in reshaping alcohol-related behaviours among Dutch students. Through the implementation of statistical and narrative nudges, the research explored their influence on predicted alcohol consumption, willingness to post alcohol related posts on social media and willingness to put pressure on peers.

Methods: The experiment was conducted through a survey-based approach, which allowed to investigate the effects of nudging strategies on alcohol-related behaviours among Dutch students. Multiple linear regressions were used to assess the impact of the nudge pages on the predicted alcohol consumption and the willingness to put pressure on peers in the future. To find the impact of the nudge pages on the willingness to post alcohol related content on social media, a logistic regression was used.

Results: Statistical analysis revealed that the statistical nudge page had a significant effect in reducing predicted alcohol consumption and the willingness to put pressure on peers over the next year. However, the impact of the narrative nudge page was not statistically significant. Both nudge types did not significantly affect the likelihood of students posting content supporting excessive alcohol use online.

Conclusions: The findings underscore that while widespread alcohol consumption remains normalized among students in the Netherlands, nudges can indeed have an impact. The statistical nudge emerged to be the most effective, notably reducing predicted alcohol consumption and the willingness to put pressure on peers over the next twelve months. However, the narrative nudge page exhibited potential in reducing predicted alcohol use, but its impact lacked significance.

Inhoud

INTRODUCTION

One of the most commonly linked factors to adolescents' drinking behaviour is peer influence (Simons-Morton, Haynie, Crump, Eitel & Saylor, 2001). This may sound innocent, but it can escalate into very dangerous situations. An example is the case of 20-year-old Sanda Dia, he was a Belgium student that tragically passed away during a hazing ritual in 2018 (NOS, 2023). During the ritual, the Belgian student and his fellow "aspirant members" were compelled to consume excessive amounts of gin. According to NOS (2023), it was revealed by the suspects of the hazing that the aim for aspirant members was to drink to the point of rendering themselves unconscious, or in other words, to induce a "coma-like" state. The incident involving 20-year-old Sanda Dia serves as a prime example of an extremely severe and uncontrolled hazing where students pressured other students to do extreme tasks, including forcing them to drink alcohol, that resulted in death. this is an extreme example of the consequences that consuming alcohol under pressure can lead to. Because research shows that social involvement causes people to drink more when they are around peers (Lorant, Nicaise, Soto & d'Hoore, 2013).

It is apparent that in the case of Sanda Dia, there was a notable level of pressure and potentially even coercion to consume excessive amounts of alcohol. In student life, alcohol consumption is often perceived as a common practice, and many students engage in heavy drinking. It is not uncommon for students to consume multiple glasses of alcohol in a single night, reaching levels that scientific studies classify as "binge drinking." According to Wechsler, Dowdall, Davenport and Castillo (1995) Binge drinking was defined as "five or more drinks per episode for men and as four or more drinks per episode for women''. Overall, 44% of the students (50% of the men and 39% of the women) binged (Wechsler et al., 1995). These amounts of alcohol are not uncommon in student life, and students often fail to grasp the potential repercussions associated with consuming such quantities of alcohol. According to Naimi, Brewer, Mokdad, Denny, Serdula and Marks (2003) does binge drinking, in general, result in acute impairment and accounts for a substantial fraction of all alcohol-related deaths.

Alcohol usage under students, especially males, tends to be very frequent and heavy. The students often drink alcohol at social events for social purposes (Wicki, Matthias, Kuntsche & Gmel, 2010). Compared to other European countries, the Netherlands score among the highest of binge drinking rates of young adults (Jander, Mercken, Crutzen & de Vries, 2013). What is commonly perceived as casually enjoying a few beers among students in the Netherlands already falls under the category of "binge drinking" according to scientific definitions. This is especially true when considering occasions where students engage in drinking that goes beyond an evening out. Given the normalization of such alcohol consumption levels, there is often a social pressure to partake in and consume substantial amounts of alcohol. Research shows that social factors are crucial to determine young adults' alcohol consumption (Foster & Spencer, 2013; van Damme, Maes, Clays, Rosiers, Van Hal & Hublet, 2013).

Students feel a societal pressure to start drinking more so that they fit in and meet the social norms they think are in place, norms they often overestimate as well. According to Crawford and Novak (2007), there is a prevalent assumption that college undergraduates who hold the belief that their peers consume more alcohol than they actually do (a common misperception) are in a vulnerable position. This assumption stems from the understanding that students often increase their alcohol use to conform to perceived social norms.

Television advertisements promoting alcohol and the sight of people enjoying alcoholic beverages on crowded terraces during pleasant weather contribute to children's exposure to alcohol. Consequently, children become accustomed to witnessing alcohol consumption, leading them to perceive it as a regular aspect of daily life. However, it is essential to acknowledge that alcohol, like other intoxicating substances, is a detrimental drug with potential health risks. As scientific research shows that alcohol plays a significant role in increasing the risk factor for the global burden of mortality (Rehm & Shield, 2013). And most students who start drinking a vast amount in their first years of college face the consequences themselves. Students are exposed to convincing evidence of the harmful effects of excessive alcohol consumption during their first few months of college: They have to nurse sick roommates, ignore inappropriate behaviour, suffer memory loss and hear about severe accidents and even fatalities brought on by alcohol (Prentice & Miller, 1993).

A significant number of young individuals in the Netherlands encounter alcohol during their lifetime, with a considerable portion of them initiating alcohol consumption during their student years (CBS, 2017). However, also according to CBS (2017), a noteworthy 34% of young people between the ages of 12 and 18 have reported consuming alcohol at least once. Even though drinking under the age of 18 is prohibited. Not surprisingly, these figures rise when young people start studying. As an illustration, within the 18-25 age bracket, typically encompassing individuals entering higher

education, a substantial 93% of Dutch young adults engage in occasional alcohol consumption. However, this percentage gradually declines to 85% among young people with a Western migration background, and further diminishes to 53% among those with a non-Western migration background (CBS, 2017). Consequently, the proportion of Dutch undergraduates aged 18 to 25 who abstain from alcohol is notably scarce.

When students transition from high school to college and embark on a new phase of life, their interactions with peers and susceptibility to peer pressure significantly influence the alcohol-related norms they adopt. There is substantiated evidence, as indicated by Read, Wood and Capone (2005), linking alcohol-related issues to social modelling. Furthermore, additional research conducted by LaBrie, Hummer, Neighbors and Pedersen (2008) has demonstrated the effectiveness of an intervention involving interactive questioning about alcohol usage, social norms, and group dynamics concerning alcohol. This intervention resulted in reduced alcohol consumption and diminished misconceptions about group behaviour related to alcohol among the treated students during the months following the experiment.

Research from Scott-Sheldon, Terry, Carey, Garey and Carey (2012) highlighted that college students that took part in an alcohol expectancy challenge (EC) intervention reported, compared to the control group, lower alcohol expectancies, reduced their alcohol use and reduced their frequency of heavy drinking. This shows that students can be influenced by interventions to reconsider their drinking behaviour. A commonly used method to reduce alcohol consumption is a brief intervention. Brief interventions can be defined as a structured, client centred and non-judgmental intervention that has shown to be effective to limit college student's drinking behaviour (Larimer, Cronce, Lee & Kilmer, 2004). Furthermore, meta-analysis of 22 RCTs conducted by Kaner, Beyer, Muirhead, Campbell, Pienaar and Bertholet (2018) showed that participants that did receive a brief intervention lowered their alcohol consumption in the year following the intervention compared to people that did not receive the intervention. Examples of these interventions are giving students homework assignments assigned by a therapist or attending group sessions.

These interventions are all time consuming, and the participants must be willing to take the time to attend these sessions or make these assignments. This study focusses on an intervention that is not time consuming and can be provided to many students at once: Information provision. The objective of this study is to lower alcohol consumption and examine the potential for raising awareness among Dutch students regarding their alcohol consumption patterns and the prevailing social pressure they face. This will be accomplished through the implementation of a nudge intervention that provides them with information about alcohol that they would not typically encounter. The aspiration is to

make students realize what damage their drinking behaviour can have to them on the short- and long term.

The difference between the brief interventions and information provision is that information provision through a nudge page can reach a very big audience at once. Especially with social media nowadays. The main difference between informational nudges and brief interventions lies in the degree of active engagement and personalization. Informational nudges tend to be less intense and require less effort from the recipient, while brief interventions focus more on providing personalized support and guidance. This makes the nudge easier to use on a big scale.

This thesis will further investigate to what extent these injunctive norms around alcohol are and how they are integrated into a student's life in the Netherlands. The aspiration for this research is to make students more aware of their alcohol consumption and, as a result, reduce their drinking norms and behaviour in the future. Furthermore, the goal of the thesis is also to emphasize that excessive amount of alcohol consumption is not something that should be normalized, given the drawbacks it can incur. Especially for students. Because individuals who start consuming alcohol at a younger age, particularly those who are underage or in college, are at a higher risk of experiencing neurotoxicity and adverse cognitive effects compared to those who begin alcohol consumption later in life. (Zeigler, Wang, Yoast, Dickinson, McCaffree & Robinowitz 2005).

Furthermore, there is also a connection between the level of education and the number of young adults who drink alcohol. Among young people who study at a university or college of higher education, 91% drink alcohol, compared to 80% of young people with a lower education (CBS, 2017). Therefore, in this research the focus group of the study will be on highly educated Dutch young adults between the ages of 18 and 27.

The goal of this study is to make students realize that you should not treat alcohol like a normal thing, just because it is socially accepted, and change their alcohol related behaviour. Therefore, the main research question for this study will be:

<u>To what extent can statistical and narrative nudges change the injunctive norms and predicted consumption regarding alcohol under students in the Netherlands?</u>

This research provides clarification on the injunctive norms around alcohol drinking that currently exist among Dutch students and the social pressure exerted by students to drink more often and more alcohol at one sitting. This is an important point to raise because the normalization of alcohol is enormous, and students do not see the consequences of this on both a physical and mental level.

Jane-Llopis and Matytsina (2006) found evidence that alcohol use contributes directly to depression, in quite some European country's even up to 10% of male depression.

Previous studies have already made a good start with this. But applying nudging, a type of non-coercive intervention on behaviour or choices (Berthet & Ouvrard, 2019) to make students more aware of their alcohol consumption creates a potential new solution to this problem.

This study contributes to the literature with the addition of a nudge page which has not previously been added. What distinguishes a nudge is that it not only focuses on personal interest, but also focuses on common interest. And it does not exclude choice options or directly change outcomes (Thaler & Sunstein, 2009). The research also builds on a study by Martens, Ferrier, Sheedy, Corbett, Anderson and Simmons (2005) that developed the Protective Behavioural Strategies Survey. Which showed that ''Protective behavioural strategies seem to be a measurable construct that are related to alcohol consumption and alcohol-related problems, and thus may be a useful component of intervention and prevention programs with college students'' (Martens et al., 2005).

Besides the academic contribution to the social economic literature, the social relevance for this research may be even higher. Because students drinking excessive amounts of alcohol is well-documented and worldwide known problem (Karam, Kypri & Salamoun, 2007; Hingson, Heeren, Winter & Wechsler, 2005; Wicki et al, 2010; Wechsler et al., 1995). Drinking these excessive amounts of alcohol can seriously harm the life of these students. Both on the short and long term. Short term problems vary from having unprotected or unintended sex to taking part in things such as vandalism (Kypri, Paschall, Langley, Baxter, Cashell-Smith & Bourdeau, 2009; Perkins, 2002; Hingson, Zha & Weitzman, 2009) and a decrease in academic performance (Thombs, Olds, Bondy, Winchell, Baliunas & Rehm, 2009). Long term results can be alcohol abuse or dependence in their adult lives (Jennison, 2004; Sher, Grekin & Williams, 2005).

Apart from the alcohol consumers themselves, society is also suffering from alcohol consumption. Because research from Van Damme et al. (2013) shows that Alcohol use involves a considerable cost for society, due to alcohol-related problems, absenteeism and premature mortality. this problem must be addressed, the results of this research can be used as policy implications by the government or other institutions. To lower these effects for the alcohol consumers themselves but also the societal costs alcohol consumption brings with it.

This paper will first investigate the injunctive and descriptive norms regarding alcohol consumption among Dutch students. Furthermore, this study is going to look at interventions that were used in previous studies to limit problematic alcohol consumption under students. Finally, nudging and the history behind nudging will be reviewed.

Following the theoretical framework, it will become clear what kind of experiment was concluded to test the main research question. The whole procedure and experimental design will be shown, explained and clarified, followed by a data analysis of all the statistical tests that were used. Furthermore, some descriptive statistics of the participants will be shown, followed by the results of the statistical tests concluded on the survey data. In the last section of this study, the results will be interpreted, and a conclusion will be drawn. The paper concluded with the limitations, suggestions for further research and implications of this study.

THEORATICAL FRAMEWORK

Interventions to limit problematic alcohol consumption under students

A substantial amount of research has been done on how to limit alcohol consumption. The interventions that have been used the most are electronic screening and brief interventions, educational and awareness campaigns and policy or regulations changes.

Starting with electronic screening and brief interventions, this is a form of intervention that targets heavy drinkers. Most used form of these interventions are counselling and learning trough assessments. This kind of intervention has shown to be effective to reduce alcohol consumption under students (Donoghue, Patton, Phillips, Deluca & Drummond, 2014). But there are several issues with introducing the interventions. Like whom should deliver the intervention to the student, peers or professional counsellors or what could be done to encourage the students to take part in the intervention (Larimer et al., 2004). What becomes clear is that with this type of intervention is time consuming and hard to implement. Since there must be awareness on the part of the student that there is a (major) problem to engage voluntarily in this kind of intervention, or when this is not the case, parents or adults must force the student to cooperate in the intervention.

Furthermore, educational and alcohol awareness campaigns are often used by college campuses to reduce alcohol consumption on campus or teach students about the consequences of alcohol. But research from Anderson, Chisholm and Fuhr (2009) showed that school-based educational campaigns did not reduce alcohol related harm, but they do provide information and increasing attention for the students. Moreover, another study focusses on parenting involvement programs and concluded that in six of the fourteen studies this kind of parental intervention did reduce substance abuse (Petrie, Bunn & Byrne, 2007).

The final intervention is the most effective one: Policy or regulation changes. The focus will be on changing the minimum drinking age and excise tax. This method is studied a lot over the years, Wagenaar & Toomey (2000) reviewed 132 studies that were published between 1960 and 1999

noted that changes in the minimum drinking age laws can reduce youth drinking and alcohol related harm. Furthermore, the most cost-effective way to lower alcohol consumption is trough excise taxes (Anderson et al., 2009).

Besides lowering the minimum age and higher excise taxes, the other methods are often expensive and time consuming. Therefore, in this experiment, the focus is on a cost-effective intervention. Information provision trough a nudge page.

Nudging and the history behind it

Nudging is something that originated in behavioural economics. It was created as a liberal solution to paternalism, a concept that ''comes from the Latin pater meaning to act like a father, or to treat another person like a child'' (Suber, 1999, p.1). And involves forcing a choice on someone, for their own good and without this person's consent (Suber, 1999). Thaler & Sunstein, (2008) argued in favour to take the compulsion away from paternalism and create something new called nudging, a non-coercive intervention to steer individuals towards desired outcomes.

There are different types of nudges, one nudge that is often used is the way a choice is presented to the decision-maker. This is called choice architecture, a term that reflects the many ways to present a choice to the decision maker, and that the choice can be influenced by the way the options are presented (Thaler & Sunstein, 2008). A widely recognized manifestation of this phenomenon is the default option, which refers to a preselected choice presented to individuals. When a particular option is set as the default, it tends to be chosen more frequently compared to alternative options (Johnson, Shu, Dellaert, Fox, Goldstein, Haubl & Weber, 2012).

The research conducted in this study examines the use of informational nudges. Specifically, participants in the treatment group were exposed to a statistical page containing information about the potential consequences of alcohol consumption. The presentation of this information also incorporated nudges, which influenced the way the information was conveyed. For instance, Fact 4 on the intervention page emphasized the relatively small number of young adults who lost their lives due to alcohol-related reasons (appendix 1, *Treatment 1: Statistical nudge*), rather than focusing on the significantly larger group who did not experience such fatal outcomes because of alcohol consumption.

Nudging and its effectiveness

Nudging has gained significant attention as a behaviour change approach, but assessing its effectiveness is crucial to understanding its potential impact. Numerous studies (Marteau, Ogivie, Roland, Suhrcke & Kelly, 2011; Marchiori, Adriaanse & De Ridder, 2017; Oliver, 2011; Migchelbrink &

Raymaekers, 2023; Hollands, Bignardi, Johnston, Kelly, Ogilvie, Petticrew & Marteau, 2017) have shown that nudging can be a working strategy to help with societal issues. Apart from the fact that nudges are effective, they are also easy to implement and mostly cost free (Marchiori et al, 2017). There are many different treatments for which you can use nudging strategies, 62% of these nudging treatments are statistically significant (Hummel & Maedche, 2019).

Demonstrated by Hollands et al, (2017) promoting behavioural change with nudges can improve desired behaviour with 15%. This study emphasizes the significant impact of employing a nudge to promote the adoption of certain behaviours. Specifically, the research concentrates on transforming social norms related to alcohol consumption, a strategy that has previously demonstrated effectiveness. By providing individuals with information about their actual peer group's alcohol consumption, including statistics on average intake, the nudge intervention successfully rectified misconceptions about social norms.

This research uses two different types of nudges. The first is more statistical and the second one is narrative. Zebregs, van den Putte, Neijens and de Graaf (2015) characterized statistical type of evidence as descriptive, numeric and quantitative. The respondents are exposed to numerous facts that aims to make respondents realise what the (lasting) consequences of alcohol consumption can be. Statistical evidence provides a strong case that certain behaviour can have specific damage for one's individual health, because this outcome has been seen among many people that engaged in the same kind of behaviour (Zebregs et al., 2015).

Narrative evidence is often based on a small number of extreme cases, which can raise the possibility that such evidence does not relate to the message receiver because they might think that such an outcome is so uncommon, that it probably won't affect their own lives like it affected the storyteller (Baesler & Burgoon, 1994). But on the other hand, Kopfman, Smith, Yun and Hodges (1998) suggested that narrative evidence can have a strong influence on people's affective responses because narrative evidence provides not only statistics, but also information about the feelings involved in a certain outcome. This in contrary to statistical evidence, which is not likely to provide such information, because the focus is exclusively on the practical outcomes of behaviour (De Wit, Das & Vet, 2008; Mazor, Baril, Dugan, Spencer, Burgwinkle & Gurwitz, 2007).

Extensive research has been conducted to ascertain the most efficacious means of conveying messages and prompting behavioural changes among individuals. Numerous studies have examined the comparative impact of narrative and statistical evidence, with differing perspectives advocating the superiority of one over the other. For instance, Zebregs et al. (2015) highlighted the advantages of narrative evidence, while others contended that statistical evidence held greater influence.

However, recent investigations have yielded results that challenge these earlier findings. Studies conducted by Yu, Ahern, Connolly-Ahern and Shen (2010), Gray & Harrington (2011), and Limon & Kazoleas (2004) demonstrated a lack of significant distinctions in terms of effectiveness between statistical and narrative evidence.

Since numerous studies have different outcomes on what kind of nudge is more effective, this study includes both a statistical nudge page and a narrative nudge page. Furthermore, since both types have a history to be an effective treatment, a decline in predicted alcohol consumption is expected for students that were exposed to a statistical or narrative nudge page. This, alongside with the literature above, results in the following two hypotheses:

Hypothesis 1: A statistical nudge page lowers predicted alcohol consumption over the next year under student in the Netherlands.

Hypothesis 2: A narrative nudge page lowers predicted alcohol consumption over the next year under student in the Netherlands.

History of normalization of alcohol

The normalization of alcohol in Europe and specifically in the Netherlands depends on several factors. First, the past plays a major role. Europeans have been drinking alcohol for decades. Even the Romans were already big fans of alcohol. They were especially huge fans of wine According to estimates based on their research, residents of the city of Rome in Roman times were already drinking in the range of 146 litres to 182 litres of wine per person per year (Gourevitch & Demigneux, 2013). During this time, drinking alcohol became part of many traditions and occasions, many of these traditions have been maintained which resulted in the fact that to this day drinking at festive occasions is the norm and sometimes even expected.

Alcohol consumption has thus been ingrained in European culture for a significant period, and this tradition has been passed down through generations. As a result, alcohol has become deeply embedded in European, including Dutch, cultural practices. Research by Anderson, Moller and Galea (2012) has shown that drinking alcohol is an ancient tradition in European culture, including the Dutch, where alcohol is integrated into social life and on social occasions.

The role social media and advertisement play in alcohol consumption

The pervasive advertising and marketing of alcohol also contribute to its normalization and consumption under students. Marketing and availability of alcohol attributed to the doubling in alcohol consumption of young adults over the past 50 years (House of Commons Health Committee, 2010). Alcohol advertisements are prevalent across various media platforms, including television, bus stops, radio, and particularly on social media. The constant exposure to these advertisements not

only influences adults but also leaves an imprint on the minds of children and adolescents. The impact of alcohol advertisements extends beyond mere awareness, as studies such as the one conducted by Anderson (2007) have indicated. This research highlights that children and adolescents exposed to media depictions of alcohol use are more likely to develop positive expectations regarding drinking. Consequently, this has significant ramifications, as subsequent studies have revealed that cultivating positive expectations around alcohol during youth correlates with increased alcohol consumption later in life. More favourable drinking expectations, perceptions of greater social acceptance for drinking, beliefs that drinking is more prevalent among peers and adults, and intentions to drink more as adults are all characteristics of young people who have more positive affective responses to alcohol advertising (Anderson, 2009).

Furthermore, a link was also established between social media use and excessive drinking behaviour. Research from Brunborg, Andreas and Kvaavik (2017) indicated that increased duration of social media usage correlated with a higher probability of adolescents engaging in excessive drinking. Therefore, the influence of social media exposure also contributes to individuals' drinking patterns. However, a separate investigation specifically examined the alcohol-related content that students encountered through social media. The findings revealed a direct connection between social media interactions and drinking behaviour, even highlighting the impact of alcohol-related posts from peers on social platforms in encouraging students to consume more alcohol (Roberson, McKinney, Walker, & Coleman, 2018).

Because alcohol related social media posts from peers and the glorification of alcohol on social media can have such a big impact on students, adolescents and even young children, it is expected that students that are exposed to the statistical or the narrative nudge page feel more responsibility to avoid the fact that children, adolescents or their own peers start getting positive associations with alcohol due to their social media posts. Therefore, the following two hypotheses are expected.

Hypothesis 3: A statistical nudge page lowers the willingness to put a post on social media glorifying excessive alcohol use under students in the Netherlands.

Hypothesis 4: A narrative nudge page lowers the willingness to put a post on social media glorifying excessive alcohol use under students in the Netherlands.

Injunctive and descriptive norms regarding alcohol consumption among Dutch students

According to Kredentser (2012), injunctive norms reflect behaviours that are widely perceived to be correct or socially sanctioned. They represent the collective understanding of what is considered acceptable or unacceptable conduct within a specific community or social setting. These norms are not necessarily based on objective standards, but rather on subjective perceptions and beliefs about

what is regarded as normal and appropriate behaviour. Injunctive norms are often shaped by social, cultural, and contextual factors, and they serve as guidelines for individuals to gauge how they should behave to fit in and be accepted by their social group. In the context of Dutch student culture, the injunctive norms associated with alcohol consumption exert a significant influence on the patterns of alcohol use.

While limited research specifically focuses on injunctive norms regarding alcohol in the Netherlands, studies conducted in other countries shed light on the prevalence of alcohol culture among students. For instance, Princeton University in the United States exemplifies a setting where clear social norms dictate that alcohol use is essential for participating in the university's social life (Prentice & Miller, 1993).

Similar alcohol cultures can be observed in European countries, including the Netherlands, where young people often consume alcohol to conform to social norms. Research conducted by Kuntsche, Gabhainn, Roberts, Windlin, Vieno, Bendtsen and Wicki (2014) demonstrated a strong positive correlation between social motivations and drinking frequency across 13 European countries, underscoring the significant influence of social norms on student drinking behaviour.

These findings underscore the contribution of social norms in the Netherlands to the prevalence of alcohol consumption among students, even though there is a dearth of specific research on injunctive norms in this context.

Students enter a new chapter of their lives where they must immediately comply with the injunctive norms that exist on campus or in their surroundings. These norms are resonated with drinking alcohol, otherwise your social life at college becomes very limited (Prentice & Miller, 1993). The transition to college for new students is a major life transition and a stressful period, including adopting new social roles and facing a new social environment (Arnett, 2000). Notably, social norms surrounding alcohol consumption play a pivotal role, not only in terms of regular drinking but also in excessive quantities. Binge drinking, characterized by consuming large amounts of alcohol in a single session, is considered the social norm for nearly half of college students (Wechsler, Lee, Kuo, Seibring, Nelson & Lee, 2002). An important factor for the students to drink these amounts of alcohol is peer pressure. Research from Kreutter & Gerwirtz (1991) showed that peer pressure has been identified as a significant predictor of alcohol and drug use among college students (Kreutter & Gerwirtz, 1991).

The literature above mentions that peer pressure can play an important role in the behaviour of student regarding alcohol consumption. It is expected that students that are exposed to a statistical or narrative nudge page to be more aware of the consequences peer pressure can have on their

fellow students. Therefore, it is expected that students that are exposed to a statistical or narrative nudge page feel less urge to put peer pressure on their fellow students in the future. This translates into the following hypotheses.

Hypothesis 5: A statistical nudge page lowers the willingness to put pressure on peers to drink alcohol under students in the Netherlands.

Hypothesis 6: A narrative nudge page lowers the willingness to put pressure on peers to drink alcohol under students in the Netherlands.

Student associations

Student associations, which many students join, intensify this culture of alcohol consumption. Research indicates that members of student associations engage in the highest levels of binge drinking (Chauvin, 2012). Thus, students that are member at a student association on engage in binge drinking even more than students that are not a member. This also means that among these students, the greatest gains can be made when it comes to reducing predicted alcohol consumption. The expectation is that with these students the nudge pages can work even better since they mostly focus on the consequences of heavy binge drinking. Since these students engage in the highest levels of binge drinking (Chauvin, 2012), it is expected that they identify more with the narrative nudge page and have more concerns about the statistics mentioned in the statistical nudge page. Therefore, it is expected that both the statistical and the narrative nudge page have more effect on students that joined an association.

Hypothesis 7: A statistical nudge page lowers predicted alcohol consumption under student in the Netherlands, especially for students that joined a student association.

Hypothesis 8: A narrative nudge page lowers predicted alcohol consumption under student in the Netherlands, especially for students that joined a student association.

The injunctive and descriptive norms related to alcohol consumption among Dutch students are significant and influential. A prevalent alcohol culture exists within student life and on college campuses. Drinking alcohol is not just accepted but expected, and failure to meet this standard can lead to difficulties in fitting in. In fact, binge drinking, where large quantities of alcohol are consumed in a single evening, is considered a normal behaviour among nearly half of all students.

EXPERIMENTAL DESIGN

Flow of the experiment

An experiment was conducted to collect the data that was necessary. In this experiment, respondents were randomly and evenly divided into three groups. The first treatment group saw a statistical nudge page as intervention, the second treatment group saw a narrative nudge page as intervention and the last group was the control group. The flow of the experiment is shown in figure 1 below.

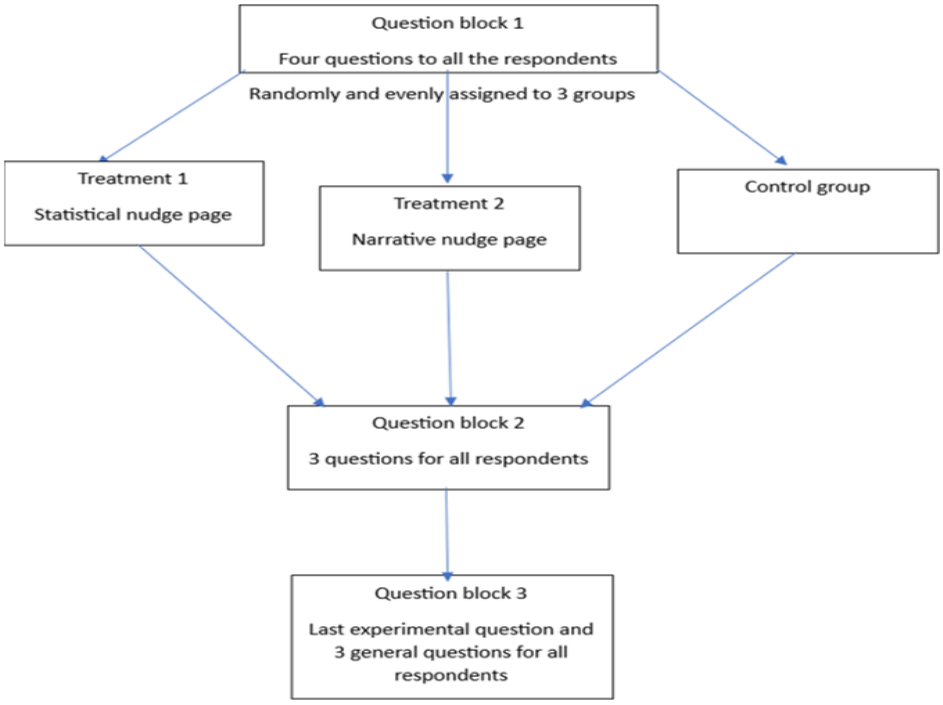

Figure 1: Flow of the experiment

Before creating the survey, research was done for the type of question that would fit these specific hypotheses. After reading and completing one of the National Alcohol Surveys (NAS) and the ''alcohol consumption'' survey from the National Institute of Alcohol Abuse and Alcoholism (NIAAA), some details came forward that seemed helpful for this survey. For example, what kind of questions are helpful to get information about the previous alcohol consumption of the respondents and what

for time period the questions about average alcohol consumption are asked. Both surveys gave helpful insights for the foundation of the research conducted in this paper.

The first page was an introduction page, the respondents were given information about the fact that the survey aims to get more insights about alcohol consumption and the peer pressure that students put on each other to drink alcohol. Furthermore, the respondents were told the duration of filling out the survey and the type of questions they could expect. Finally, the respondents were made aware of their anonymity and that the data is used specifically and only for this research. If they went through with the survey, they agreed to these terms.

Following the introduction page, the respondents started with the actual experiment. At first, they had to answer two questions about their alcoholic consumption in the past twelve months. Starting with *'' How many standard glasses of alcohol did you drink on average per week over the past 12 months?''.* Where the respondents could fill in their answer in an open text field. A standard glass of alcohol is defined as approximately 12 millilitres of alcohol, that equals 250 millilitres of beer, 100 millilitres of wine or 35 millilitres of hard liquor. The next question was a multiple-choice question: *''On average in the past 12 months. How many days in the week did you consume an alcoholic beverage?''* With answer option varying from 0 days per week to 7 days per week. The goal of these questions was to find out what the respondent personally considers as a normal weekly alcohol consumption. For this reason, the questions were asked in a timeframe of 12 months, to avoid non-representative answers due to vacations or exams.

Furthermore, student had to indicate how much knowledge they have on the short- and long-term effects from drinking alcohol, on a scale of zero to ten. *''Indicate how much you agree with the following statement: I know about the short- and long-term effects from drinking alcohol on a scale of 0-10. Where 0 is having no knowledge and 10 is having perfect knowledge about the short- and long-term effects from drinking alcohol.*'' The question was asked as a slider where respondents had to indicate their level of knowledge. The goal of this question was to find out what kind of awareness the students have of what effects their own alcohol consumption has on them. The last question on the first page was: *''Did you ever put social pressure on someone to drink alcohol, while he or she planned to not drink at all that day?''* To see if the student ever took part in pressuring someone else to drink alcohol.

When the students have completed these questions, they were equally and randomly divided in three groups. The experiment consists of two different type of treatment groups and one control group. The first treatment group was exposed to a statistical nudge page containing alarming facts about the potential consequences of (excessive) alcohol consumption. The statistical nudge page was

chosen for its ability to deliver factual information and data-driven insights. By presenting students with quantifiable data about the risks and consequences of alcohol consumption, this nudge aimed to appeal their rational decision-making process. The statistical nudge used the power of concrete information to highlight the harmful effects of excessive alcohol use, tapping into the cognitive aspect of behaviour change.

On the other hand, the narrative nudge page was specifically designed to resonate with students on an emotional and personal level. The inclusion of a real-life story from a former alcohol addict who suffered from Korsakoff syndrome added a human element to the nudge. This narrative was intended to elicit empathy and create a relatable feeling among students, potentially influencing their attitudes and perceptions toward alcohol consumption. Because the students want to avoid contracting Korsakoff and living like the person in the story.

Statistical nudge page:

Because many people who drink alcohol underestimate the consequences, here are 7 startling facts about alcohol:

1. Around the world, alcohol is a major and significant contributor to illness and death. According to a WHO estimate, alcohol consumption killed more than 3 million People worldwide in 2018. That is more than 5% o all deaths. This means that of every 20 people who die in the world, more than 1 died due to the effects of alcohol! (World Health Organization, 2018)

2. Already drinking more than 1 standard glass of alcohol per day is associated with an increase in the risk of morbidity & mortality. (Rehm et all, 2009)

3. A lot of people fail to realize how addictive alcohol really is, they think an addiction will never happen to themself. But they are wrong, according to the NIAA, about 15% of everyone who drinks alcohol develops an alcohol disorder or addiction at some stage in their lives. (National institute on Alcohol Abuse and Alcoholism, 2020)

4. Among all deaths among young people between the ages of 15 and 29 worldwide. About 10% are caused by alcohol-related causes. (World Health Organization, 2018)

5. In the US alone, alcohol was involved in 29% of all traffic accident deaths. This equates to one alcohol-related traffic death every 52 minutes. (National Highway Traffic Administration, 2019)

6. Excessive alcohol consumption leads to a higher chance of developing over 200 nasty conditions. Including liver disease, cardiovascular disease, many types of cancer and neurological disorders. (Rehm et all., 2010)

7. Excessive alcohol consumption can also lead to Korsakov syndrome. This is a syndrome like dementia and is almost always caused by excessive alcohol consumption, estimations show that up to 5% of the people with a heavy alcohol addiction will get Korsakoff. (Alheimers.org.uk) (korsakovkenniscentrum.nl)

Narrative nudge page:

-English below:

This is a short version of Maarten's story. Maarten has contracted korsakov's syndrome after an alcohol addiction. With this syndrome, you get serious problems with your short and long-term memory, and it also often happens that you fill up forgotten memories with memories that are not correct. In his story, he briefly talks about what his life is like right now because of his alcohol addiction.

Maarten's room is full of bills; little lists, poems, thoughts, sayings. A bill tells what he must do before he goes to sleep: close the window, close the door, for almost everything in life Maarten must have a bill. On the closet hangs a bill with dates when he can Skype with his sons. And there are hundreds more like this. Maarten rattles loose. 'I don't remember everything, but I have found a way to deal with it. I have Korsakov, which is a disorder, not an illness. I'm not damaged in my mind.' Martin has folders full of drawings and poems. One begins with "My body is lost and mutilated," a poem full of pain and sorrow. 'My wife cheated on me.' On his desk hangs a long letter headed 'My agony.' Between the words is written small: 'self-inflicted.' He makes a gesture of knocking back a glass. He was addicted to alcohol. '2007 I was in Detox. 2010 came the RM, the Judicial Authorization. Then I was compulsorily incarcerated. That didn't feel right. Unjustly it felt. Then I cut my wrist. 'I didn't want to go on anymore, my life was mutilated by alcohol'.

Control group

Personally, I find it odd that the laws surrounding alcohol are so lenient compared to those concerning other drugs. One comparison that is often made is with marijuana. According to Jellinek, marijuana is ranked number 10 among the most harmful drugs (Jellinek.nl). Furthermore, it is impossible to experience a lethal overdose from marijuana alone (Todd, 2018). Yet, in the Netherlands, you can purchase an unlimited amount of alcohol in stores, while the sale of marijuana, for instance, is limited to a maximum of 5 grams per day.

After the respondents were exposed to either the statistical nudge page, the narrative nudge page or page for the control group, they all had to answer follow up questions about their future behaviour regarding alcohol. The first block of three questions after the nudge pages included *''On average, how many standard glasses of alcohol do you plan to consume per week in the next 12 months?''* To see if the intervention changed their planned alcohol consumption over the next year. Secondly, the students had to slide a bar to answer their desired knowledge about the short- and long-term effects of alcohol in 12 months from now. *''On a scale of 1-10: How much knowledge would you like to have about the short- and long-term effects of (excessive) alcohol consumption in exactly 12 months? Where 0 is having no knowledge and 10 is having perfect knowledge.''* The last question of this block was also a slider. The students were asked to slide a bar on a scale of 0-10, where 0 was strongly disagree and 10 was strongly agree with the following question: ''*I would, in the future, put social pressure on people to drink alcohol on an event where they were planning not to drink at all''*?

The final experimental question was a behavioural economic question. The students were showed a pre-written social media post that supported excessive alcohol consumption. The students were then asked if they would put this online for a disclosed amount of money. The students saw the following:

Picture a photo of yourself holding a bottle of liquor ready to drink it all after a busy day with the following caption:

"Preparing for an epic journey, one daring sip at a time. Ready to down the whole bottle and conquer the world, I embark on a spirited adventure with a full bottle of my favorite elixir. Here's to the thrill of embracing the bold, the taste of liberation, and the unrivaled joy of indulgence. Join me as I dive headfirst into the depths of pure intoxication. 🍾🌟 #UnleashTheSpirit #CheersToTheChallenge"

The question was as following: *''what would be the minimum amount of money you would like to receive to put the post below openly on all your social media accounts? (Facebook, Instagram, LinkedIn, Twitter, Etc.)''* Where the students could either put an amount down that would satisfy them to post this on their social media or tick the box *''I would not post this online for any amount of money.''*

Finally, the students got three general questions about their age, city they study in and lastly if they are a member of a student association.

Data analysis

To test hypothesis 1 and 2. A linear regression was used to check if the statistical nudge page and the narrative nudge page lower the expected alcohol consumption under students in the Netherlands. The first equation for the regression looks as the following:

1. *Predicted alcohol consumption* = β0 + β1 * Statistical nudge + β2 * Narrative nudge + ε

After this, control variables will be added to the regression to avoid bias. The equation for the regression with added control variables looks as the following:

2. *Predicted alcohol consumption* = β0 + β1 * Statistical nudge + β2 * Narrative nudge + β3 * Age + β4 * City + β5 * Association + ε

In both these regressions, predicted alcohol consumption is the dependent variable. β0 is the constant, representing the value of the dependent variable when all predictors are 0. β1, β2, β3, β4 and β5 represent the coefficients for statistical nudge page, narrative nudge page, age and categorical variable city, indicating the expected change in predicted alcohol consumption associated with a one-unit increase in statistical nudge, narrative nudge, age, city and association. β1, β2, β3 are expected to be negative. β4 depends on the city the student studies and β5 is expected to be positive, because it is expected that students that joined an association have higher predicted alcohol consumption than students that did not join an association. ε represents the error term in these regression equations.

Furthermore, for hypothesis 1, also a Mann-Whitney U test was conducted. To test if the planned consumption significantly differs for student that were exposed to a statistical nudge page and the

control group. For hypothesis 2, the same Mann-Whitney U test was conducted on the narrative nudge page. To test if the planned consumption significantly differs for students that were exposed to the narrative nudge page and the control group.

For hypotheses 3&4, two logistic regressions were done, because the dependent variable is a dummy variable that can either be 0 or 1. 0 for if people would never put a social media post online supporting excessive alcohol use, and 1 for students that would. The first regression is without control variables, the second with. The logistic regression equations looks as the following:

3. *willingness to put a post on social media glorifying alcohol* = β0 + β1 * statistical nudge + β2 * narrative nudge + ε
4. *willingness to put a post on social media glorifying alcohol* = β0 + β1 * Statistical nudge + β2 * Narrative nudge + β3 * Association + β4 * City + ε

β0 is the constant, representing the value of the dependent variable when all predictors are 0. β1 and β2 represent the estimated logarithms of the odds ratios. Furthermore, the statistical nudge and narrative nudge are the independent variables. Finally, ε represents the error term in these regression equations. β1 and β2 are expected to be lower than 1, β3 is expected be higher than 1, because the socials norms regarding alcohol are more extreme at associations. β4 depends on the city the student studies in.

To test hypothesis 5&6. Two multiple linear regressions were used to check if the statistical and narrative nudge pages lower the willingness to put social pressure on peers under students in the Netherlands. Regression 5 is without control variables and regression 6 with controls. The equations of the regressions looks as the following:

5. *Willingness to put social pressure on peers* = β0 + β1 * Statistical nudge + β2 * Narrative nudge + ε
6. *Willingness to put social pressure on peers* = β0 + β1 * Statistical nudge + β2 * Narrative nudge + β3 * Association + β4 * Age + β5 * City + ε

In the regression model, β0 serves as the constant and signifies the value of the dependent variable when all predictors hold a value of 0. Coefficients β1 and β2 correspond to the effects of the statistical nudge and narrative nudge respectively, indicating the anticipated alteration on the 0-10 scale measuring the inclination to exert social pressure on peers with a one-unit increase in the respective nudges. A decrease in the willingness to exert social pressure is expected for both β1 and β2. While β3 is projected to have a positive value due to the heightened extremity of social norms pertaining to alcohol within associations. Conversely, β4 is anticipated to be negative, while the

influence of β5 hinges on the specific city where students are pursuing their studies. Ultimately, the error term ε accounts for variability not explained by the regression equations.

For hypothesis 7&8, a linear regression with an interaction term was used with and without control variables. The regression equations look as the following:

7. *Predicted alcohol consumption* = β0 + β1 * Statistical nudge + β2 * Narrative nudge + β3 *association + β4 * Statistical nudge * association + β5 * Narrative nudge * association + ε
8. *Predicted alcohol consumption* = = β0 + β1 * Statistical nudge + β2 * Narrative nudge + β3 *association + β4 * Statistical nudge * association + β5 * Narrative nudge * association + β6 * Age + β7 * city + ε

In both regressions the dependent variable is predicted alcohol consumption. β0 is the constant term, representing the value of the dependent variable when all predictors are 0. β1 represents the coefficient for statistical nudge, β2 represents the coefficient for the narrative nudge, indicating the expected change in predicted alcohol consumption associated with a one-unit increase in statistical or narrative nudges. β3 represents the coefficient for association, indicating the expected change in predicted alcohol consumption associated with a one-unit increase in association. Furthermore, β4 and β5 represents the coefficients for the interaction term between the statistical nudge and association and between narrative nudge and association, indicating how the effect of the statistical nudge page and narrative nudge page on predicted alcohol consumption is modified by different levels of association. Finally, ε represents the error term in these regression equations. β4 and β5 are expected to be negative coefficients, because it is expected that students that joined an association drink more than students that did not join an association, and therefore can benefit even more from the nudges. β6, the coefficient of age is expected to lower predicted alcohol consumption, and β7 is dependent on the city the student studies in.

RESULTS

Procedure

To test the hypothesis, an experiment was conducted under student in the Netherlands between the ages of 18-27. The link for the experiment was shared on social media through Instagram, Facebook and WhatsApp. Also, students studying at the TU Delft were asked to fill in the survey in return for a free coffee. The link was accompanied with a small invitation to the survey and information that it was for the graduation of a bachelor student. Furthermore, the respondents were told that the survey would take approximately 5 minutes of their time, was about alcohol consumption and was meant only for students in the Netherlands within the age of 18-27. The experiment was conducted

on www.qualtrics.com, completely web-based and questions were asked in English. In appendix 1 print screens of the whole experiment will be provided.

Participants

130 students filled in the survey completely, the youngest students were 18 years old, and the oldest student was 27 years old. The average age was 21.77 (SD = 2.09). Furthermore, 66 (50.77%) of the students that filled in the survey completely studied in Delft, 27 (20.77%) in Rotterdam, 19 (14.62%) in Leiden, 7 (5.38%) in Utrecht, 6 (4.62%) in Amsterdam, 1 (0.77%) in Groningen and 4 (3.08%) did not study in one of the big student cities of the Netherlands. Finally, 88 (67.69%) of the students were a member of a student association at the time they filled in the survey, 42 (32.31%) students were not part of a student association.

Missing values

208 students started with the survey. Only 130 of them filled in the survey completely. After analysing where the students quit the survey data showed that 151 students did fill in the first block of questions but quit after. One of many possible reasons for this could be that students that received the survey link in a group chat did click on the survey and started the first couple of questions, but then quit because it would take too much of their time. Because these students left almost all the questions open, their data was excluded from the dataset.

151 were divided into either the first treatment group, second treatment group or the control group. But 21 students stopped with the survey after, possibly because they did not want to make the time to read the nudge pages or the control group pages. These students did fill in the questions about their behaviour regarding alcohol in the past 12 months. However, since the focus of this study is what the student's predicted behaviour is regarding alcohol in the next year, these students were also excluded from the dataset.

Nudging effects on predicted alcohol consumption.

The means of the predicted alcohol consumption of the group that was exposed to the statistical nudge page, the group that was exposed to the narrative nudge page and the control group are presented in figure 2 below:

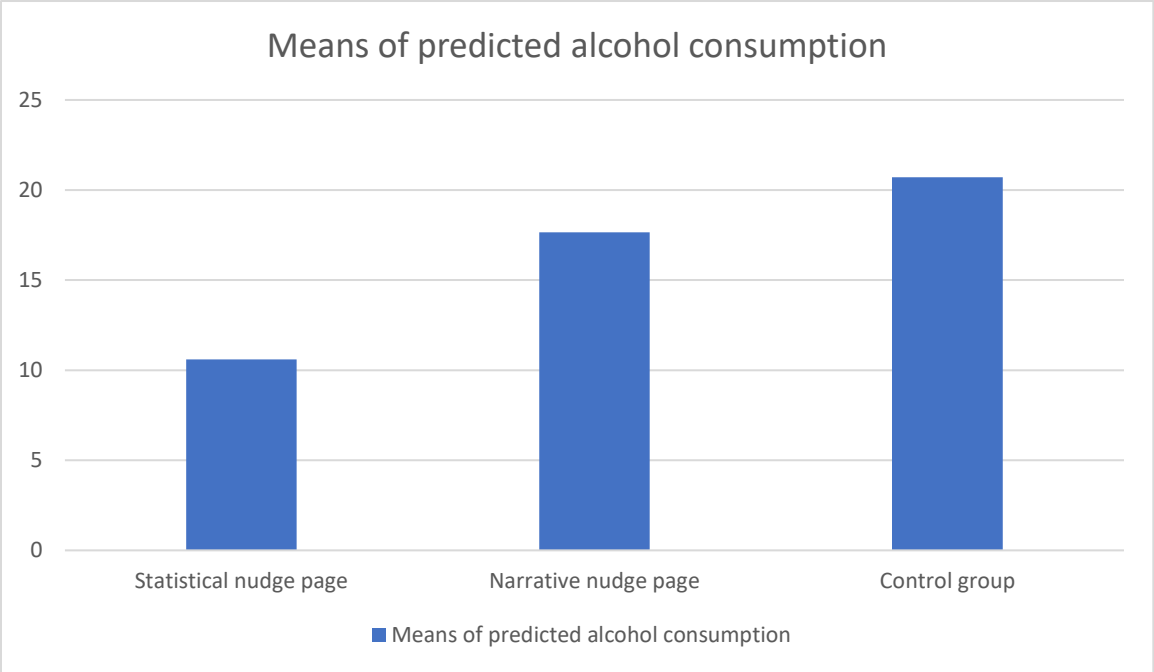

Figure 2: Means of predicted alcohol consumption by group. Y axis is predicted amount of standard glasses alcohol consumed per week in the next twelve months.

Mann-Whitney U test

To test if the predicted alcohol consumption significantly differs from students that were exposed to the statistical or the narrative nudge page and students in the control group, separate Mann Whitney U tests were conducted for predicted alcohol use between the students that were exposed to the statistical and narrative nudge page and student in the control group.

A Mann-Whitney U test was performed to evaluate whether predicted alcohol consumption differed by a statistical nudge page compared to students that were not exposed to the statistical nudge page. The means of predicted alcohol consumption for the students exposed to the statistical nudge page and the control group were [10.59] and [20.71], respectively.

The results indicated that students exposed to the statistical nudge page had significantly lower predicted alcohol consumption than students that were in the control group, z = [2.729], p = [0.0064]

Furthermore, a Mann-Whitney U test was performed to evaluate whether predicted alcohol consumption also differed by a narrative nudge page, compared to students that were not exposed to the narrative nudge page. The means of predicted alcohol consumption for the students exposed to the statistical nudge page and the control group were [17.65] and [20.71], respectively.

The results indicated that there was no significant difference between the predicted alcohol consumption of students exposed to the narrative nudge page and students in the control group, z = [0.063], p = [0.9499]

Regressions

To test if a statistical or a narrative nudge lowers the predicted alcohol consumption under students in the Netherlands, a linear regression has been used with robust standard errors to address potential heteroscedasticity. This contributes to the Mann-Whitney U tests because it shows the association between both the nudges and the predicted alcohol consumption, while controlling for the effects of other variables. Furthermore, the regression analysis also provides coefficients that quantify the magnitude and direction of the relationships between both the statistical and narrative nudge and the predicted alcohol consumption. The output of the regression was as following:

Table 1. Linear Regressions: Effect of nudge pages on predicted alcohol consumption

	Predicted alcohol consumption	
	(1) Without Controls	**(2) With Controls**
	Coefficient	**Coefficient**
Statistical nudge	-10.11587***	-9.490034***
	(3.160)	(3.060)
Narrative nudge	-3.059948	-1.764475
	(3.375)	(3.355)
Age		-1.424132**
		(0.707)
Association		3.561396
		(2.796)
City		
Rotterdam		5.531148
		(4.410)
Delft		10.02952***
		(2.861)
Groningen		7.492537***
		(3.691)
Amsterdam		1.475
		(5.950)
Utrecht		3.864373
		(3.698)
Other		2.390044
		(3.994)
Constant	20.71111***	38.48005***
	(2.867)	(19.153)

N	130	130
R^2	0.0848	0.2637

Notes: * p < 0.10, ** p < 0.05, *** p < 0.01. The results presented are gathered using linear regressions.

Regression 1 in table 1 shows that a statistical nudge page has a significant negative effect with coefficient -10.12. This means that on average, ceteris paribus, if a student is exposed to the statistical nudge page, they predict to drink 10.12 less standard glasses of alcohol per week in the next twelve months compared to students that were not exposed to the statistical nudge page.

Furthermore, regression 1 in table 1 also shows that the narrative nudge page has an insignificant negative effect with coefficient -3.06. This means that, based on the current sample and model, there is insufficient statistical evidence to conclude that the narrative nudge page has a significant effect on predicted alcohol consumption.

To check if there are other factors that play a role in the predicted alcohol consumption under students in the Netherlands, a second regression has been done with three added control variables. continuous variable 'age', categorical variable 'city' and dummy variable 'association'. 'Age' is the age of the students, 'city' is the city the student studies in, and 'association' means whether a student became a member of a student association or not. The output was as the following:

Regression 2 in table 1 with control variables shows again that a statistical nudge page has a significant negative effect with coefficient -9.49. This means that on average, ceteris paribus, if a student is exposed to the statistical nudge page, they predict to drink 9.49 less standard glasses of alcohol per week in the next twelve months compared to student that were not exposed to the statistical nudge page.

Furthermore, regression 2 in table 1 also shows that the narrative nudge page has an insignificant negative effect with coefficient -1.76. This means that, based on the current sample and model, there is insufficient statistical evidence to conclude that the narrative nudge page has a significant effect on predicted alcohol consumption.

Age has a negative significant (P=0.046) negative effect with coefficient -1.42. This indicates that on average, ceteris paribus, for each one-year increase in age, the predicted alcohol consumption under students is expected to decrease by 1.42 standard glasses of alcohol.

Rotterdam (5.53), Delft (11.38), Groningen (10.01), Amsterdam (2.52), Utrecht (6.30) and other (2.39) all show positive coefficients for the predicted alcohol consumption under students. Delft (P=0.000) and Groningen (P=0.000) show significant coefficients. This indicates that on average, participants from the Delft and Groningen have 11.38 and 10.01 more predicted standard glasses of alcohol than

the reference category Leiden. Holding all other variables constant. Rotterdam (P=0.113), Amsterdam (P=0.691), Utrecht (P=0.174) and other (P=0.551) have insignificant coefficients, this means that, based on the current sample and model, there is insufficient statistical evidence to conclude that studying in these cities has a significant effect on predicted alcohol consumption.

Association has an insignificant effect on predicted alcohol consumption with coefficient 3,56. This means that, based on the current sample and model, there is not enough evidence to conclude that being part of a student association has a meaningful impact predicted alcohol consumption.

To check if the statistical and narrative nudge pages lower predicted alcohol consumption, especially for students that are member of a student association, a linear regression was done with an interaction term between the Statistical nudge page and variable 'association' and for the narrative nudge page and variable 'association' with robust standard errors to address potential heteroscedasticity. The results were as following:

Table 2. Linear Regressions: Interaction effect between nudge pages and association on predicted alcohol consumption

Predicted alcohol consumption	
(1)	**(2)**
Without Controls	**With Controls**
Coefficient	**Coefficient**

Statistical nudge	-9.89697	-8.43711
	(6.487)	(5.913)
Narrative nudge	-7.113636	-6.548433
	(6.636)	(6.610)
Association	4.430481	1.794391
	(7.108)	(6.775)
Statistical nudge * Association	0.4361854	-1.922384
	(7.479)	(6.917)
Narrative nudge * association	7.356556	7.38624
	(7.700)	(7.873)
Age		-1.606866**
		(0.721)
City		
Rotterdam		5.670733
		(4.190)
Delft		9.350971***
		(2.847)
Groningen		4.983242
		(3.658)
Amsterdam		0.3537578
		(5.582)
Utrecht		2.294789
		(4.875)
Other		3.717044
		(3.523)
Constant	17.36362***	47.73604**
	(6.334)	(19.524)
N	130	130
R^2	0.1501	0.2789

Notes: * p < 0.10, ** p < 0.05, *** p < 0.01. The results presented are gathered using linear regressions.

As shown in regression 1 in table 2, the statistical nudge page, narrative nudge page and association have an insignificant coefficient. This means that, based on the current sample and model, there is insufficient statistical evidence to conclude that the narrative nudge page has a significant effect on predicted alcohol consumption.

In the regression 2 in table 2, the statistical nudge page, narrative nudge page and association have an insignificant coefficient. This means that, based on the current sample and model, there is insufficient statistical evidence to conclude that the narrative nudge page has a significant effect on

predicted alcohol consumption. Age does have a negative significant coefficient of -1.61. This indicates that on average, ceteris paribus, for each one-year increase in age, the predicted alcohol consumption under students is expected to decrease by 1.61 standard glasses of alcohol.

Nudging effects on willingness to share alcohol related post on social media.

To check if both the statistical and narrative nudge page have effect on the student's willingness to put a post online supporting excessive alcohol online for a disclosed amount of money, a logistic regression has been used with robust standard errors to address potential heteroscedasticity. Since the dependent variable can only be either 0 if the students would never put the post online for any amount of money, or 1 for the students that would put the post online for a disclosed amount. The results were as following:

Table 3. logistic Regressions: Effect of nudge pages on willingness to put a post on social media glorifying excessive alcohol consumption.

	Willingness to put a post on social media glorifying excessive alcohol consumption	
	(1) Without Controls	**(2) With Controls**
	Odds ratio	**Coefficient**
Statistical nudge	0.4967742	0.5098199
	(0.223)	(0.243)
Narrative nudge	0.6272401	0.6937813
	(0.281)	(0.345)
Association		2.760311**
		(1.207)
City		
Rotterdam		0.967741
		(0.675)
Delft		1.167693
		(0.731)
Groningen		1
		(empty)
Amsterdam		0.2984183
		(0.344)
Utrecht		3.296848
		(4.205)
Other		0.3128382
		(0.383)
Constant	2.214286**	0.3786058
	(0.716)	(0.320)

N	130	130
Pseudo R^2	0.0148	0.2789

Notes: * p < 0.10, ** p < 0.05, *** p < 0.01. The results presented are gathered using linear regressions. Constant estimates baseline odds.

As shown in table 3, the effect from a statistical nudge is insignificant with an odds ratio of 0.50. The narrative nudge page is also insignificant with an odds ratio of 0.63. This means that both the statistical and narrative nudge pages are not statistically significant in predicting the probability whether the students are more willing to put a post on their social media glorifying excessive alcohol consumption. In the second regression in table 3, with controls, association is statistically significant. This means that Students who are part of an association have on average, ceteris paribus, 2.76 times more chance of being willing to put a post on social media glorifying excessive alcohol consumption compared to students who are not part of an association.

Nudging effects on social pressuring.

To check if both the statistical and narrative nudge pages have any effect on the willingness to put social pressure on their peers, a linear regression has been used with robust standard errors to address potential heteroscedasticity. The dependent variable is a scale from 0-10. The regression is as the following:

Table 4. Linear Regressions: Effect from nudge pages on willingness to put pressure on peers to drink alcohol.

Willingness to put pressure on peers to drink alcohol.		
	(1) **Without Controls**	**(2)** **With Controls**
	Coefficient	**Coefficient**

Statistical nudge	-1.422222**	-1.283064**
	(0.569)	(0.589)
Narrative nudge	-0.329299	0.3651076
	(0.590)	(0.585)
Association		1.201836**
		(0.558)
Age		0.0465399
		(0.125)
City		
Rotterdam		-0.4006765
		(0.924)
Delft		0.314541
		(0.924)
Groningen		-4.116391***
		(0.925)
Amsterdam		-2.396383**
		(1.084)
Utrecht		-2.203616*
		(1.195)
Other		-0.6564824
		(1.751)
Constant	4.422222***	1.323733
	(0.435)	(3.241)
N	130	130
R^2	0.0506	0.1706

Notes: * p < 0.10, ** p < 0.05, *** p < 0.01. The results presented are gathered using linear regressions. Dependent variable Is a scale from 0-10.

As shown in table 4 above, the statistical nudge has a significant negative effect on the willingness to put social pressure on peers to drink alcohol with a coefficient of -1.42. this means that average, ceteris paribus, if a student is exposed to the statistical nudge page it reports, on a scale of 0-10, 1.42 points lower than students that were not exposed to a statistical nudge page. The narrative nudge page has an insignificant effect on the willingness to put pressure on peers. This means that, based on the current sample and model, there is not enough evidence to conclude that a narrative nudge page has a significant impact on the willingness to put pressure on peers. In regression 2 in table 4, association has a significant effect on the willingness to put pressure on peers to drink alcohol. This means that on average, ceteris paribus, students that are member of a student association score 1.20 point higher on the 0-10 scale compared to students that did not join an association. Furthermore, Amsterdam and Groningen also have significant effect on the willingness to put pressure on peers to drink alcohol with coefficients -4.12 and -2.40, this means that students that study in Groningen

score on average, ceteris paribus 4.12 points lower on the 0-10 scale than students that study in the reference category, Leiden. For students in the city of Amsterdam this means that on average, ceteris paribus 2.40 points lower on the 0-10 scale than students that study in Leiden.

DISCUSSION

Interpretation

In both regression analyses presented in Table 1, encompassing models both with and without control variables, it becomes evident that the statistical nudge exerts a noteworthy and negative impact on the anticipated alcohol consumption among Dutch students. Evidenced by the coefficient of -9.96 in the second regression, as shown in table 1, it can be deduced that students exposed to the statistical nudge page exhibited an average reduction of 9.96 standard alcohol glasses in their predicted consumption, ceteris paribus. This finding resonates with multiple prior studies (Marteau et al., 2011; Marchiori et al., 2017; Oliver, 2011; Migchelbrink & Raymaekers, 2023; Hollands et al., 2017), which similarly demonstrated that nudging could serve as an effective strategy in addressing societal concerns. Furthermore, an additional test was carried out to ascertain if the intended consumption significantly differed based on exposure to the statistical nudge page. The Mann-Whitney U test also yielded a statistically significant result (P=0.0064), reinforcing the impact of the statistical nudge. This means that planned alcohol consumption significantly differs according to the statistical nudge page. This conclusion supports the statement made above. Furthermore, in both regressions in table 1, the narrative nudge page gave insignificant negative effect on predicted alcohol consumption. The P value from the Mann-Whitney U test was also insignificant (P=0.9499). This provides additional prove that the narrative nudge pages, in this particular event, had an insignificant effect on predicted alcohol consumption. In the present context and given the existing sample and model, there exists insufficient statistical support to establish that the narrative nudge page exerts a significant impact on predicted alcohol consumption. However, it's crucial to note that the absence of statistical significance for a coefficient does not inherently imply that the narrative nudge page holds no influence over anticipated alcohol consumption. Potential factors contributing to this lack of significance could include the limited sample size, which might not be sizable enough to detect a significant effect, or the presence of other confounding variables exerting an influence on the relationship. A plausible explanation for the lack of significant effect could be rooted in the students' potential inability to connect with the narrative due to perceiving the depicted outcome as uncommon, thereby distancing it from their own experiences (Baesler & Burgoon, 1994). Additionally, Baesler & Burgoon (1994) noted that statistical evidence was more efficacious than narrative evidence, a finding that aligns with the outcomes from both regression analyses presented in Table 1 and the results of the Mann-Whitney U tests.

To interpret if the effect of both the statistical and narrative nudge page works especially for students that joined a student association, a multiple linear regression was done to find if there is any interaction between both the nudges and students that joined an association. The focus will be on regression 2 in table 2 with control variables. Here, the coefficient for the statistical nudge page is -8.44 and the coefficient for the interaction term between the statistical nudge page and association is -1.92. This means that for students that are not a member of an association, exposure to the statistical nudge page is associated with, on average and ceteris paribus, a decrease of 8.44 units in predicted alcohol consumption. However, for individuals who are members of the association, this effect is even stronger, with exposure to the nudge page associated with an additional decrease of 1.9 standard glasses in predicted alcohol consumption. But the coefficients are not statistically significant, this means that, based on the current sample and model, there is insufficient statistical evidence to conclude that the statistical nudge page has a significant higher effect on predicted alcohol consumption when students are a member of an association.

Furthermore, for the narrative nudge page, the coefficient for the statistical nudge page is -6.55 and the coefficient for the interaction term between the statistical nudge page and association is 7.39. exposure to the narrative nudge page is associated with, on average and ceteris paribus, a decrease of 6.55 units in predicted alcohol consumption. However, for individuals who are members of the association, this effect is moderated, and the decrease in predicted alcohol consumption is less pronounced, with an increase of 7.39 units. In other words, the narrative nudge page seems to have a stronger effect in reducing alcohol consumption for non-members of the association compared to members. Again, the coefficients are not statistically significant, this means that, based on the current sample and model, there is insufficient statistical evidence to conclude that the narrative nudge page has a significant lower effect on predicted alcohol consumption when students are a member of an association.

Limited to no research has been done to verify if alcohol-related interventions are more effective for students that are member of an association compared to students that are not. The results show that the statistical nudge page seemed to have a bigger impact on students that are a member of an association compared to students that did not, while the narrative nudge page seemed to give the opposite of the desired outcome, since the interaction coefficient was positive.

In table 3, a logistic regression was done with as dependent variable the willingness to put a post supporting excessive alcohol consumption on your social media as a dummy variable, holding value 0 if the students would not post this online for any amount of money and 1 if they would. The statistical nudge page has an insignificant odd ratio of 0.50. This means that on average, ceteris

paribus, if a student was exposed to the statistical nudge page, the chance of them willing to put a post online supporting excessive alcohol consumption is 0.5 times as high as someone in the control group. But since the odds ratio is insignificant, there is insufficient statistical proof that this is only caused by the statistical nudge page. Furthermore, the narrative nudge page also had an insignificant odd ratio. The odd ratio was 0.63, this means that on average, ceteris paribus, the chance of them willing to put a post online supporting excessive alcohol consumption is 0.63 times as high compared to students that were not exposed to a nudge page. But since the odds ratio is insignificant, there is insufficient statistical proof that this is only caused by the narrative treatment.

It is worth noting that the results align with previous research findings that emphasize the potential of digital nudges to drive behavioural change across various domains, both online and offline (Purohit, Barclay, & Holzer, 2020). These studies have demonstrated the capacity of nudges to impact decision-making by altering the presentation of information or choices, and thereby influencing behavioural outcomes. While this study's findings suggest a certain trend in reducing the willingness to post content supporting excessive alcohol consumption, the absence of statistical significance for the odds ratios emphasizes the need for further investigation into the nuanced factors that contribute to these outcomes.

To interpret if the nudge pages lower the willingness to put social pressure on their peers in the future, the results of the regression shown in regression 2 in table 4 show the following: The statistical nudge page has a significant effect with coefficient -1.28. This means that on the scale of 0-10, students that were exposed to the statistical nudge page slid on average, ceteris paribus, 1.42 points lower than students in the control group. Moreover, to interpret if the narrative nudge page has any effect on the willingness to put social pressure on their peers in the future, the results of the regression shown in regression 2 of table 4 show the following: The narrative nudge page has an insignificant effect with coefficient 0.37. This means that on the scale of 0-10, students that were exposed to the narrative nudge page slid on average, ceteris paribus, 0.37 points higher than students in the control group.

In the context of reducing negative peer pressure, previous research by Paluck & Green (2009) has provided insights into the potential efficacy of interventions that influence perceptions of social norms and foster a supportive environment for prosocial actions. While not directly focused on nudges, their study highlights the broader concept that interventions can contribute to shaping behaviours within peer groups. The significant effect that the statistical nudge page has on the willingness to pressure peers aligns with this study. The results also align with a previous study from Baesler & Burgoon (1994), who stated that statistical evidence was more effective than narrative

evidence. Not only was the coefficient for the narrative nudge page insignificant, but the coefficient was also positive. This means that students that were exposed to the narrative nudge page slid higher on the scale than the control group. Therefore, the statistical nudge page is more efficient in terms of lowering the willingness to put pressure on peers under students in the future.

Follow up research and policy implication.

Enhanced Policy Implications

The empirical results derived from the four regression analyses provide deeper insights into the potential effectiveness of different nudging strategies concerning predicted alcohol consumption among student populations. Examining the nuanced outcomes of each nudge, in relation to specific contexts and demographic factors, allows for more targeted policy implications that can guide organizations and policymakers in shaping effective interventions.

Differential Impact of Nudging Strategies

The study's results reveal a diverse range of impacts associated with various nudging strategies. Specifically, the statistical nudge emerged as a consistently influential factor across multiple dimensions. It demonstrated significant and negative effects on predicted alcohol consumption and the reduction of peer pressure, thus positioning itself as a promising approach to address these aspects within the student population. This contrasts with the narrative nudge, which exhibited mixed and non-significant effects, suggesting a need for careful consideration of its application.

Targeting Specific Audiences

The question of which nudge is more effective becomes pivotal when considering different target audiences. The statistical nudge's efficacy in lowering predicted alcohol consumption makes it an attractive option for students who might be influenced by data-driven insights. Its potential to resonate with those who value concrete information aligns with a policy approach that targets individuals who are more responsive to empirical evidence. In contrast, the narrative nudge, while not displaying consistent effectiveness, might have relevance for certain subgroups that are more attuned to storytelling and relatable narratives.

Policy Implementation and Format

Translating these insights into actionable policies involves a multifaceted approach. Strategies could include integrating the statistical nudge into alcohol awareness campaigns or digital platforms commonly accessed by students. Interactive data visualization tools could amplify the impact of the statistical nudge, presenting information in engaging formats that resonate with the target audience.

The narrative nudge, on the other hand, might find relevance in workshops or events that focus on storytelling and its role in influencing perceptions and behaviours.

Further Research

This study has shed light on the potential effectiveness of nudging strategies in influencing predicted alcohol consumption and willingness to post alcohol-related content on social media. However, several avenues for further research and follow-up investigations remain open. These endeavours can help refine our understanding of the mechanisms behind nudging strategies and their applicability in addressing alcohol-related behaviours within specific contexts.

Combined Nudging Strategies: Integrating Statistical and Narrative Evidence

An intriguing direction for future research would be to explore the synergistic effects of combining both statistical and narrative evidence within a single nudge strategy. Building upon the findings of Allen, Bruflat, Fucilla, Kramer, McKellips, Ryan and Spiegelhoff (2000), who suggested that a blend of statistical and narrative evidence can be more persuasive than either form in isolation, an investigation into the potential benefits of amalgamating these two types of evidence could enhance the effectiveness of nudging interventions. By utilizing a combination of both evidence types, nudge strategies could be designed to exert a stronger impact on individuals' attitudes and behaviours related to alcohol consumption.

Targeted Nudging: Tailoring Nudges to Specific Subgroups

Another avenue for future research involves delving deeper into the potential variations in the effectiveness of nudging strategies across distinct subgroups of the population. For instance, more research to see whether the responses to nudges differ among individuals affiliated with associations compared to those who are not could provide valuable insights. This examination could aid in refining the customization of nudging interventions to cater to the specific needs, motivations, and susceptibilities of different subgroups. It would be particularly beneficial to understand why certain nudges might work better for certain groups and under what conditions.

Long-Term Effects and Sustainability

A crucial aspect for future exploration is the long-term sustainability of the observed effects of nudging interventions. Investigating whether the changes in attitudes and behaviours persist over time or if they fade away shortly after exposure to the nudges could provide valuable insights into the durability of the interventions. Longitudinal studies that assess participants' behaviours and attitudes at multiple time points after exposure to the nudges can provide a clearer picture of the

lasting impact of the interventions and help determine their practical viability as part of broader campaigns aimed at reducing alcohol-related behaviours.

Limitations

While this study provides valuable insights into the potential of nudging strategies in influencing predicted alcohol consumption and willingness to post alcohol-related content, there are several limitations to consider. First, the study is based on self-reported measures, which may be subject to response biases or social desirability effects. This reliance on self-reported data might not fully capture participants' true behaviours and attitudes. Secondly, the study focuses on predicted behaviour rather than actual behaviour, potentially limiting the real-world applicability of the findings. While predicted behaviour can provide valuable insights, actual behaviour might differ due to various external factors.

Additionally, the study was conducted within a controlled experimental setting, and the results may not fully translate to real-world situations where participants are exposed to influences beyond the experimental context. Furthermore, the relatively small sample size of 130 respondents may impact the generalizability of the findings. This limited sample size might have implications for the randomization across groups. The unequal distribution of average alcohol consumption across the three groups could be an unintended consequence of this limitation, affecting the validity of the results.

Finally, implementing incentives could have provided a more complete understanding of the nudging strategies' effectiveness. Incentives, such as small monetary rewards, could have been offered to students for more accurate responses during the survey. These financial incentives could have encouraged participants to engage more actively with the tasks, potentially reducing response biases.

CONCLUSION

The focus of this study centred on the prevailing alcohol norms among Dutch students and the examination of strategies aimed at reshaping behaviours through nudging. The findings underscore that while widespread alcohol consumption remains normalized among students in the Netherlands, nudges can indeed have a meaningful impact.

The statistical nudge page emerged as the most effective, notably reducing predicted alcohol and the willingness to put pressure on peers in the future. While the narrative approach exhibited potential

in reducing consumption, its impact missed significance. These outcomes suggest that while narratives hold promise, additional factors may contribute to shifts in predicted alcohol use.

Additionally, the study explored the potential differential impact of the nudges on students associated with a specific group, students that were member of an association. However, the results did not yield significant differences in this regard. Being part of an association did not appear to lead to distinct variations in how the nudges influenced anticipated alcohol consumption. This outcome emphasizes the importance of further investigation to better understand how nudging strategies interact with different student backgrounds.

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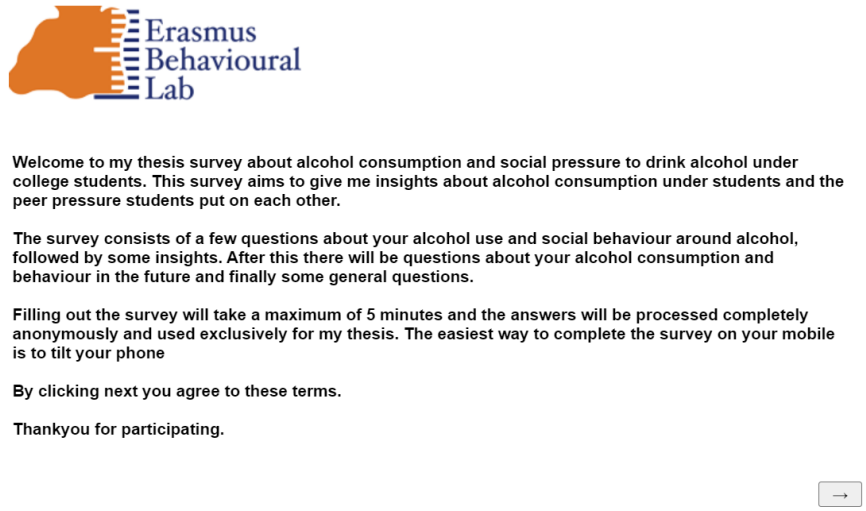
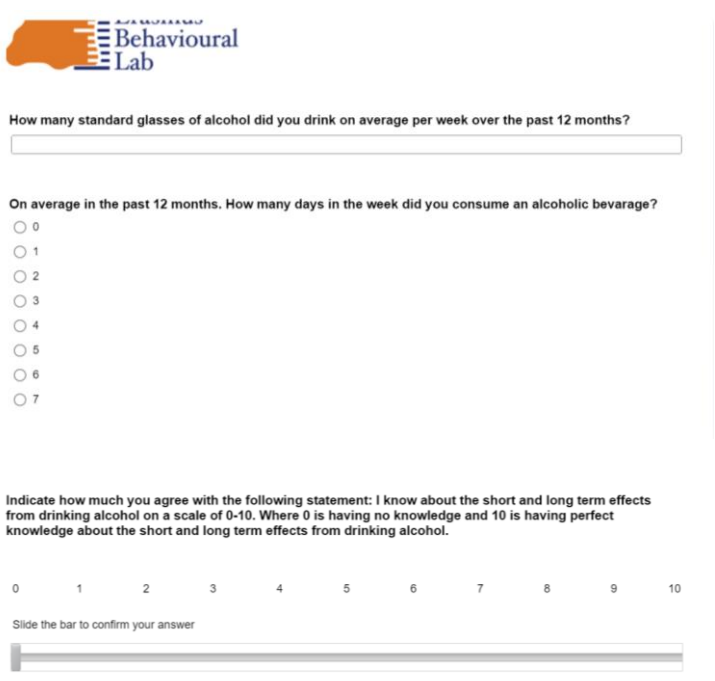
APPENDIX

Whole experiment

Introduction



Question block 1



Treatment 1: Statistical nudge

Because many people who drink alcohol underestimate the consequences, here are 7 startling facts about alcohol:

1. Around the world, alcohol is a major and significant contributor to illness and death. According to a WHO estimate, alcohol consumption killed more than 3 million People worldwide in 2018. That is more than 5% o all deaths. This means that of every 20 people who die in the world, more than 1 died due to the effects of alcohol! (World Health Organization, 2018)

2. Already drinking more than 1 standard glass of alcohol per day is associated with an increase in the risk of morbidity & mortality. (Rehm et all, 2009)

3. A lot of people fail to realize how addictive alcohol really is, they think an addiction will never happen to themself. But they are wrong, according to the NIAA, about 15% of everyone who drinks alcohol develops an alcohol disorder or addiction at some stage in their lives. (National institute on Alcohol Abuse and Alcoholism, 2020)

4. Among all deaths among young people between the ages of 15 and 29 worldwide. About 10% are caused by alcohol-related causes. (World Health Organization, 2018)

5. In the US alone, alcohol was involved in 29% of all traffic accident deaths. This equates to one alcohol-related traffic death every 52 minutes. (National Highway Traffic Administration, 2019)

6. Excessive alcohol consumption leads to a higher chance of developing over 200 nasty conditions. Including liver disease, cardiovascular disease, many types of cancer and neurological disorders. (Rehm et all., 2010)

7. Excessive alcohol consumption can also lead to Korsakov syndrome. This is a syndrome like dementia and is almost always caused by excessive alcohol consumption, estimations show that up to 5% of the people with a heavy alcohol addiction will get Korsakoff. (Alheimers.org.uk) (korsakovkenniscentrum.nl)

Treatment 2: Narrative nudge

-English below:

This is a short version of Maarten's story. Maarten has contracted korsakov's syndrome after an alcohol addiction. With this syndrome, you get serious problems with your short and long-term memory, and it also often happens that you fill up forgotten memories with memories that are not correct. In his story, he briefly talks about what his life is like right now because of his alcohol addiction.

Maarten's room is full of bills; little lists, poems, thoughts, sayings. A bill tells what he must do before he goes to sleep: close the window, close the door, for almost everything in life Maarten must have a bill. On the closet hangs a bill with dates when he can Skype with his sons. And there are hundreds more like this. Maarten rattles loose. 'I don't remember everything, but I have found a way to deal with it. I have Korsakov, which is a disorder, not an illness. I'm not damaged in my mind.' Martin has folders full of drawings and poems. One begins with "My body is lost and mutilated," a poem full of pain and sorrow. 'My wife cheated on me.' On his desk hangs a long letter headed 'My agony.' Between the words is written small: 'self-inflicted.' He makes a gesture of knocking back a glass. He was addicted to alcohol. '2007 I was in Detox. 2010 came the RM, the Judicial Authorization. Then I was compulsorily incarcerated. That didn't feel right. Unjustly it felt. Then I cut my wrist. 'I didn't want to go on anymore, my life was mutilated by alcohol'.

Control group

Personally, I find it odd that the laws surrounding alcohol are so lenient compared to those concerning other drugs. One comparison that is often made is with marijuana. According to Jellinek, marijuana is ranked number 10 among the most harmful drugs (Jellinek.nl). Furthermore, it is impossible to experience a lethal overdose from marijuana alone (Todd, 2018). Yet, in the Netherlands, you can purchase an unlimited amount of alcohol in stores, while the sale of marijuana, for instance, is limited to a maximum of 5 grams per day.

Question block 2

On average, how many standard glasses of alcohol do you plan to consume per week in the next 12 months?

On a scale of 1-10: How much knowledge would you like to have about the short- and long-term effects of (excessive) alcohol consumption in exactly 12 months? Where 0 is having no knowledge and 10 is having perfect knowledge.

Extremely bad 0 1 | Somewhat bad 2 3 | Neither good nor bad 4 5 6 | Somewhat good 7 8 | Extremely good 9 10

Click to write Choice 1

I would, in the future, put social pressure on people to drink alcohol on an event where they were planning not to drink at all

Strongly disagree 0 1 | Somewhat disagree 2 3 | Neither agree nor disagree 4 5 6 | Somewhat agree 7 8 | Strongly agree 9 10

Click to write Choice 1

what would be the minimum amount of money you would like to receive to put the post below openly on all your social media accounts. (Facebook, Instagram, Linkedin, Twitter, Etc.)

- ○ €0-€300
- ○ €300-€500
- ○ €500-€1000
- ○ €1000-€2000
- ○ €2000+
- ○ I would not put this online for any amount of money.

Picture a photo of yourself holding a bottle of liquor ready to drink it all after a busy day with the following caption:

"Preparing for an epic journey, one daring sip at a time. Ready to down the whole bottle and conquer the world, I embark on a spirited adventure with a full bottle of my favorite elixir. Here's to the thrill of embracing the bold, the taste of liberation, and the unrivaled joy of indulgence. Join me as I dive headfirst into the depths of pure intoxication. 🍾🌟 #UnleashTheSpirit #CheersToTheChallenge"

Question block 3

What is your age?

What city do you study?

- ○ Leiden
- ○ Rotterdam
- ○ Delft
- ○ Groningen
- ○ Amsterdam
- ○ Utrecht
- ○ Other

Are you a member of a student association?

- ○ No
- ○ Yes