

(Don't) raise your glass - The effects of health warning labels on the willingness to drink

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Abstract

Aim: The aim of this study was to discover the effects of textual and graphic health warnings on Instagram, in particular, on alcohol related and branded posts. Currently, in many European countries, the legislation regarding alcohol advertisements online and on social media is lacking and self-regulatory codes by the industry appear to be insufficient. Vulnerable groups such as children and adolescents are targeted as well, and there are no functioning warning mechanisms to protect those groups. Research highlights the encouraging effects that exposure to alcohol posts has on those who see them online, including higher drinking intentions.

Method: A 2x2 between-subjects experimental design ($N = 140$) was tested, where a textual alcohol warning vs no textual alcohol warning and a graphic alcohol warning vs no graphic alcohol warning have been measured to investigate the effect on 'attitude towards the advertisement', 'attitude towards the product', and 'attitude towards alcohol'.

Findings: A MANOVA analysis was conducted. However, no significant main effects of 'textual warning' and 'graphic warning' on the 'attitude towards the advertisement', 'attitude towards the product', and 'attitude towards alcohol' could be found. Furthermore, there was no significant interaction effect between the 'textual warning' and 'graphic warning'.

Conclusions: Although the results were non-significant, there are learnings to consider. Although there was no significant result found, health warning labels remain an important tool to inform and warn about harming products, such as alcohol. Nevertheless, more research is necessary to discover different types of warning labels in online settings and their effectiveness.

Key words: Adolescent drinking; Social Media; Advertising; Health warning labels; Alcohol

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1. Introduction

Branded content on social media displaying alcohol advertisements is a problem for consumers of all age, but especially for vulnerable groups such as adolescents and young adults. The lack of statutory regulations and the non-appliance of self-regulatory norms set by marketing councils worldwide are an increasing the issue. Therefore, this study aims to research effective measures that could decrease the drinking intention after seeing alcohol posts on social media need to be discovered and tested.

Among many nations in Europe, drinking appears to be an important part of leisure time activities. Whether it is at festivals, concerts, soccer games, or going to a bar or restaurant on the weekend with friends. According to the Organisation for Economic Co-operation and Development (OECD, 2021a), on average a citizen above 15 years consumed 8.7 liters per capita of pure alcohol across OECD countries in 2019.

Although in many countries the legal drinking age is 18 years or older, with some differences, for instance Germany, research shows that adolescents make their first drinking experiences before reaching the legal drinking age. Across OECD countries, 21.5% of 15 year olds were drunk at least twice in their lifetime (OECD, 2021b). According to the World Health Organization (WHO, 2018), 43.8% of teenagers in the WHO Europe region between 15 and 19 years old are categorized as current drinkers, followed by 38.2% in the Americas and 37.9% in the Western Pacific Region. It becomes apparent that more teenagers are currently consuming alcohol in the European region than in other regions of the WHO. In Germany, approximately 50% of teenagers between 11 and 17 years old are consuming alcoholic beverages (Zeihner et al., 2018). A study of Moor et al. (2017) revealed that over 70% of German teenagers in the age of 15 years consumed alcohol at least once in their lifetime, 50% consumed at least once within the last month and approximately 40% engaged at least once in heavy episodic drinking, also known as binge drinking.

Over the last few years and with the rise of social media, digital advertising has become increasingly important. InBev and Diageo, two of the world's largest alcohol manufacturers, are spending 15% of their annual global income on marketing (Burton et al., 2017). Furthermore, the six largest alcohol companies spent approximately 17.7 billion US dollars on marketing in 2017 (Jernigan & Ross, 2020). Moreover, current research on the matter suggests the significant association between awareness of digital alcohol marketing and increased drinking behaviors (e.g. Critchlow et al., 2016; Jernigan et al., 2016; Noel et al., 2020).

Another important part of marketing and advertising are influencers. In a study researching Dutch influencers and alcohol related posts, Hendriks et al. (2020) found that 63.5% of the influencers posted so-called alcoposts, and 75 out of 384 posts were branded posts, of which 33.3% showed a sponsorship disclosure and only 8 out of these posts showed an educational slogan. This suggests that this kind of post can reach anyone and influence them. The lack of identifiable warnings and ad disclosures might have negative consequences for those who see and engage with this content.

According to the WHO (2010), one of the easiest ways to reduce adolescent drinking and heavy episodic drinking behaviors is to regulate or ban the advertisement on alcoholic beverages. However, the WHO Regional Office for Europe (2020) observes that approximately one third of the WHO European countries have no regulations in regard to alcohol advertisements online and on social media. Furthermore, there are big discrepancies, as regulation policies range from complete bans with penalties for legal offenses to self-regulatory codes of conduct without any legal obligation (WHO Regional Office for Europe, 2020).

In Germany, alcohol advertising on the internet and on social media is regulated in the 'Interstate Treaty on the Protection of Human Dignity and the Protection of Minors in Broadcasting'. According to the Kommission für Jugendmedienschutz (2020), Article 6 Section 5 of the treaty stipulates that "Advertising for alcoholic beverages must neither be directed towards children and adolescents nor show them drinking alcoholic beverages" (p.9). This treaty is of statutory nature. Additionally, there are self-regulatory rules introduced by the German advertising council (Deutscher Werberat). These rules are presented in the "Code of Conduct on Commercial Communication for Alcoholic Beverages". According to the code, commercial communication for alcoholic beverages shall neither promote drinking of alcoholic beverages by minors nor show minors in the act of drinking or promoting the drinking of such beverages, shall not be conveyed by media the majority of whose editorial content addresses minors, shall not make any claim or representation to the effect that minors are not old enough to consume alcoholic beverages and so provoke drinking, shall not show persons stating that they drank alcoholic beverages as minors, and shall neither be shown on sports kits worn by sports teams comprising minors nor be conveyed in advertising and sponsoring campaigns that are directly related to minors (Deutscher Werberat, 2009, p.2).

Although the industry established codes of conduct for self-regulation, it is doubtful that those codes are effective. Research suggests that alcohol advertisements violate the content guidelines of alcohol marketing self-regulatory code and indicates that the current self-regulatory systems governing alcohol marketing practices are not meeting their intended goal

of protecting vulnerable populations (Monteiro et al., 2017; Noel et al., 2017). Carah and Brodmerkel (2021) argue that systematic monitoring and disclosing alcohol marketing strategies to the public are necessary steps to produce an evidence-based research agenda regarding the effects of alcohol marketing.

The aim of this study is to test the effectiveness of different nudges in form of health warning labels applied to branded social media posts aiming to reduce the willingness to drink among German high school students in the age of 16 to 19 years. Hence, the research question for the paper at hand is:

RQ₁: *What is the effect of textual and graphic health warning labels applied to branded social media posts on the Willingness to Drink among German adolescents aged between 16 and 19?*

In order to answer this research question, previously published literature will be assessed and discussed in the theoretical framework. Based on the findings, the different interventions will be designed and tested in a 2 (textual warning: health warning label vs. no health warning label) x 2 (Graphical warning: Graphic warning label vs. no graphic warning label) experimental design and described in the methodology section. Finally, the results will be analyzed, presented and critically discussed in the discussion part. Furthermore, practical and theoretical implications will be presented.

2. Theoretical framework

In the following section, different literature regarding the topic will be presented and critically assessed. First of all, the focus will lay on the willingness to drink. Afterwards, nudging will be defined, and literature presented. Then, the different types of warning labels will be considered. Additionally, based on the findings of the literature search, hypotheses will be formulated, and the research models will be presented.

2.1 Willingness to drink

The effect of social media posts containing alcoholic beverages on the willingness to drink has been extensively researched. For instance, Brunborg et al. (2022), found an association between time spent on social media and increasing drinking behaviors over the next three years, and argue that "adolescents learn alcohol use by observing and mimicking the behaviour of others, and by observing the consequences of others 'behaviour.'" (p.5). Furthermore, Jackson and Barthlow (2020) state that attitudes towards alcohol are influenced by exposure to marketing

promoting alcoholic beverages. Moreover, Critchlow et al. (2019) state that participation with messages promoting alcohol is associated with higher risk drinking and a significant association between awareness of alcohol marketing and an increased frequency of binge drinking was found (Critchlow et al., 2016). Additionally, Kurten et al. (2022) identified a link between liking posts containing alcohol and drinking behavior on the same day. This suggests "that the alcohol industry is reactive to changes in how young adults use the internet and have developed digital marketing strategies that appear successful in reaching them and encouraging them to participate." (Critchlow et al., 2016, p.333). Meerkerk and van Straaten (2018) emphasize that exposure to alcohol advertisements is associated with adolescents' binge drinking initiation. This shows the effect that alcohol posts can have on audiences and their drinking behavior and highlights the risks for vulnerable groups, for instance, adolescents. Hence, mechanisms that can help to reduce the influences of those advertisements on adolescents must be discovered.

2.2 Nudging

The concept of nudging was originally introduced by Thaler and Sunstein in 2008, and has since then been applied in different settings. According to Thaler and Sunstein (2021), nudging is defined as:

Any aspect of the choice architecture that alters people's behavior in a predictable way without forbidding any options or significantly changing their economic incentives. To count as a mere nudge, the intervention must be easy and cheap to avoid. [...]. Putting the fruit at eye level counts as a nudge. Banning junk food does not (p.8).

Nowadays, design has become an important part of nudging and shaping social responsibly behavior. Tromp et al. (2011) identify four different types of design which can be used to alter peoples' behaviors, namely, coercive design (strong and explicit), persuasive design (weak and explicit), seductive design (weak and implicit), and ultimately decisive design (strong and implicit). Those types can also be used for designing nudges.

Nudging is used in different setting and areas. It is also used by governments around the world. According to Schmidt (2017), nudging can be transparent and democratically controlled, which also leads to less uncontrolled private nudging and hence, "increasing democratic control over choice environments" (p. 415). One area where nudging is frequently used is food, mainly

to increase healthy lifestyle behaviors. A study of Reynolds et al. (2019) discovered the effectiveness of different policies changing unhealthy behaviors (Smoking, drinking, food). They found that the majority of the participants think that nudging is an acceptable practice to change unhealthy behaviors, and state that adding warning labels to products is the most acceptable practice. It becomes apparent that nudging has become increasingly important and that it plays a crucial role, especially in health-related contexts.

2.3 Warning labels

Health warnings are used in a multitude of settings with the ultimate aim to improve and support healthy behaviors. According to a study of Stautz and Marteau (2016), alcohol warnings reduced the urge drink and suggest that negative images have an influence on “health-related cognition and behaviour, perhaps via a priming process whereby viewing images of ill health activates motivation for good health” (p.8). When it comes to the design and placement of voluntary health warning labels, Tinawi et al. (2018) argue that current labels are lacking in salience, visibility and readability and suggest to introduce standardized labels which highlight alcohol-related risks in order to inform the consumer effectively. Research in which long-term interventions were tested, suggests that alcohol warnings which are visible and containing new and specific information, could become part of effective labeling strategies (Kokole et al. 2021). Furthermore, it can be seen as a tool to raise awareness and take part in an alcohol prevention and policy approach. Warning labels are one mechanism that can be used to nudge people towards a healthier lifestyle. In the following parts, two different types of warnings will be presented, namely textual and graphic warnings.

2.3.1 Textual warnings

One sort of warning labels are textual warning messages which are already used on cigarette packages, for instance. There is also research on textual health warning labels on alcoholic beverages. Kang and Lee (2017) argue that this is an effective strategy to reduce binge drinking urges among students, especially if loss frame messages (negative messages) are used. Research of Hassan et al. (2022) showed the effectiveness of different message types and found a preference for health focused warning messages, instead of social isolation messages. Furthermore, they also support loss frame health messages. A study of Morgenstern and Hanewinkel (2019) supports the effectiveness of negative messages on adolescents as well, although they argue that the effect was only small. Another study in support of health warning labels shows that communicating the risk of illnesses, in particular cancer, can reduce the

selection of alcoholic beverages (Clarke et al., 2020). Overall, it becomes apparent that textual health warning labels, especially negative (loss) frame warnings can have a positive impact in reducing the willingness to drink. Based on these findings, the following hypothesis can be formulated:

H₁: *Nudges containing textual health warning messages can decrease the willingness to drink.*

Figure 1

Model of the effect of textual warnings on willingness to drink



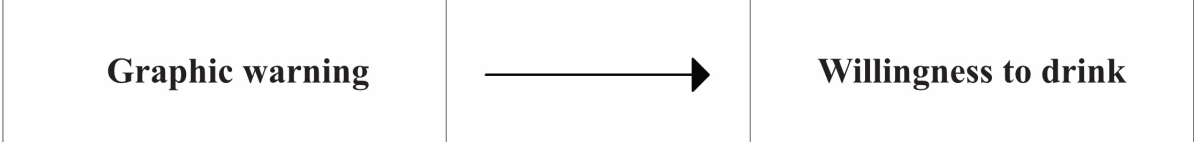
2.3.2 Graphic warnings

Another type of warning labels that can be used as nudges to reduce alcohol consumption are graphic warning labels. A study of Morgenstern and Hanewinkel (2019) illustrates that the presentation of graphics warning labels which show an alcohol warning can have effects on adolescents and their cognition. A different study of Reynolds et al. (2019) comparing different nudging methods to improve healthy behaviors found that graphic warning labels were the most acceptable nudging method, compared to taxation and changing serving size. In regard to the effectiveness of pictorial or graphic health warnings, Sillero-Rejon et al. (2018) suggest that highly severe warnings are perceived as more effective and influence the motivations to reduce drinking, but at the same time create avoidance and reactance. Furthermore, Stafford and Salmon (2016) argue that textual and graphical warning labels can have an impact on drinking speed when being confronted with warning labels while drinking. In addition, they show that when being confronted with pictorial warning labels, the time is almost twice as much when finishing a drink, compared to not being exposed to health warning labels. Wigg and Stafford (2016) investigated the effectiveness of health warnings on alcoholic beverages and found that pictorial health warnings increased intentions to reduce or quit alcohol consumption. After reviewing literature, it becomes apparent that graphic warning labels are used in different settings already and that they could be used to the drinking intentions after seeing advertisements on social media. The following hypothesis can be formulated:

H₂: *Nudges containing graphic warning labels can decrease the willingness to drink.*

Figure 2

Model of the effect of graphic warnings on the willingness to drink



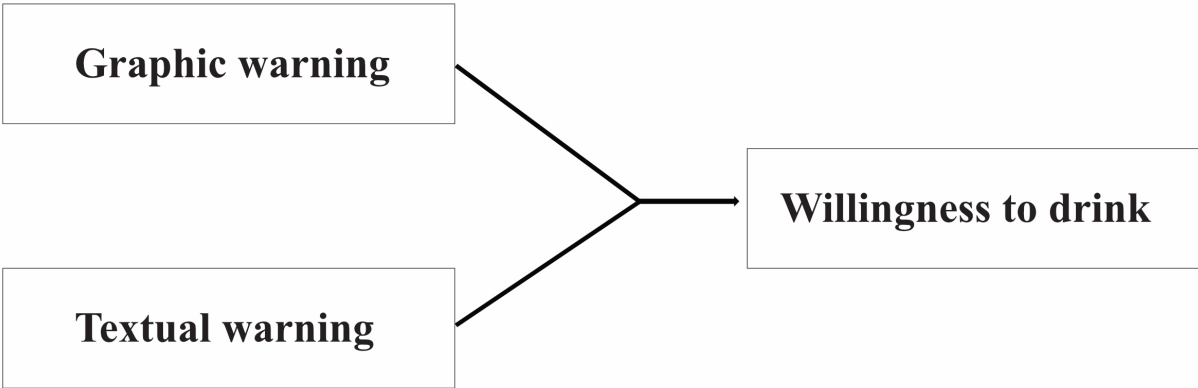
2.3.3 Interaction between textual and graphic warnings

Since the study is a 2x2 experimental design, the main effects of the textual warning nudge and the graphical warning nudge will be tested. In addition, the interaction between the two variables will be discovered. According to Vallance et al. (2017), combining both, textual and graphic warnings, may be an effective manner to ensure that labels can reach different subgroups of drinkers and that highlighting risks of alcohol consumption may increase awareness and generate discourse. Therefore, the following hypothesis can be formulated:

H₃: *There is an interaction effect between the textual warning nudge and the graphical warning nudge on the willingness to drink.*

Figure 3

Interaction between textual and graphic warnings on the willingness to drink



2.4 Research purpose

From this literature review, it becomes apparent that there is a lot of available relevant research discovering the effects of different health warning labels in a multitude of settings. However, the effect of health warning labels in the context of social media, and more precisely on branded Instagram posts are yet to be discovered. Considering the lack of regulations, and the impact that this lack might have on adolescents, it appears to be important to research the effect of health warnings on social media, in particular on Instagram.

3. Methodology

In the following section, the method will be laid out. The aim of the study is to find out the effects of health warning labels on the willingness to drink. Therefore, different stimuli need to be designed. First of all, the focus will lay on the preliminary study, which focuses on finding the design choices of the stimuli. Based on the results, the stimuli materials will be designed and presented. Afterwards, the methodology of the main study will be elaborated.

3.1 Pre-Study

In order to investigate the influence of nudging on Instagram on the willingness to drink, different stimulus materials need to be designed, namely a textual health warning and a graphical health warning. Hence, a small preliminary study was conducted, where first, two mock-up Instagram posts were tested for realism. Afterwards, two textual warnings were tested and finally, three graphical warnings were tested and ranked.

3.1.1 Procedure

The preliminary study in form of a questionnaire and was designed in the “Qualtrics”-software. In the beginning the participants were informed about the aim of the research, the participants’ rights were presented, and participants were asked to consent. Afterwards, the participants were asked to answer some questions regarding the demographics, namely age, level of education, and gender. Then, two different Instagram posts containing a beer and a wine advertisement were presented (Appendix A) and the participants were asked a set of questions, including questions such as: ‘I think that the post looks realistic’, ‘I think that this post could be on social media’, ‘I think that it is communicated sufficiently that this post is an advertisement’, and ‘I think that this post could be from a real influencer’. Subsequently, two textual health warnings

were introduced, and the participants were asked to answer the following statements on a 5-point Likert-scale: 'I realize that this is a warning', 'I think that this warning sounds realistic', and 'I think that this warning makes me think about alcohol consumption'. Ultimately, three graphical warnings, which were designed in Affinity Publisher, were introduced (Appendix B) and the participants were asked to answer the following statements on a 5-point Likert-scale: 'I realize that this is an alcohol warning', 'the images look realistic', and 'the images draw my attention'. Afterwards, the participants were asked to rank the three warning labels from most realistic to least realistic.

3.1.2 Participants

In total, 29 people participated in this research, of which 24 were female and 5 were male. The participants were between 18 and 56 years old ($M=22.93$; $SD=8.49$) and were of German, Polish and Dutch nationality. However, all of the participants spoke sufficiently German, since the questionnaire was distributed only in German. 71.4% were enrolled in Bachelor studies or finished those, 17.9% were in a job training and 10.7% were in high school.

3.1.3 Results

In order to analyze the responses, the data set was exported and analyzed using descriptive statistics in SPSS. First of all, the two Instagram posts (Appendix A) were tested. For the beer post, the participants indicated that it looks considerably realistic ($M=3.10$; $SD=1.29$), and that this post could be posted by a real influencer ($M=3.83$; $SD=1.07$). Furthermore, it was indicated that the posts do lack in communicating that the presented image is an ad ($M=2.62$; $SD=1.21$). The wine advertisement was also considered as realistic ($M=3.66$; $SD=1.08$), participants indicated that it could be found on social media ($M=4.34$; $SD=.897$) and posted by a real influencer ($M=4.03$; $SD=1.052$). However, this post also lacked in communicating that this an advertisement ($M=2.59$; $SD=.907$). Concluding, it is noticeable that the posts in general are perceived as realistic and that such posts could actually be found on social media. Nonetheless, it became apparent that the stimuli need improvement when it comes to communicating that those posts are advertisements.

Next, the two textual warnings were analyzed. Text warning 1 was perceived as a warning ($M=4.00$; $SD=1.65$) and perceived as realistic ($M=3.48$; $SD= 1.243$). However, participants indicated that it makes them think to a moderate extent about alcohol consumption ($M=2.93$; $SD=1.334$). Textual warning 2 was also perceived as a warning to a considerable extent ($M=3.59$; $SD=1.323$) and as considerably realistic ($M=3.31$; $SD= 1.168$). Furthermore,

it considerably makes participants think about alcohol consumption ($M=3.14$; $SD=1.246$). After comparing both textual warnings, it was decided that textual warning 1 will be used in the main study.

Ultimately, the graphical warnings were analyzed. The graphical warnings were perceived as alcohol warnings to a sufficient extent ($M=3.72$; $SD=1.279$), and as sufficiently realistic ($M=3.41$; $SD=1.240$). Furthermore, it was indicated that the warning labels draw the attention moderately ($M=3.07$; $SD=1.361$). Afterwards, the order of the three options was analyzed. Warning 1 was put first 6 times, the second warning 7 times and the third warning 12 times. Hence, the warnings are generally accepted and perceived as intended. Graphical warning three will be used in the main study, due to its popularity in the preliminary study.

3.2 Stimuli

This study aims to test the effectiveness of textual and graphic warnings applied to Instagram posts on the willingness to drink. Thus, two Instagram posts were created (Appendix A), one containing a product placement for a beer brand and one for a wine brand. Both advertisements depict groups of friends in two different settings. It was decided to choose pictures of groups rather than of individuals, since research shows that 17% of alcoholic advertisements contain groups of people, because they convey camaraderie, which connotes friendship, familiarity and fun (Barry et al., 2018). The images in the mock-up post were retrieved from iStock and the posts were created with Affinity Publisher.

Based on the results of the preliminary study, the following textual health warning was chosen: “Gesundheitswarnung: Mehr als 60 Krankheiten wurden mit Alkoholkonsum in Verbindung gebracht. Konsumieren sie bewusst! [Health warning: Over 60 diseases have been causality linked to alcohol use. Enjoy responsible!]”. This slogan was created based on different literature, which suggests that health focused warning messages are effective in successfully communicating risks (e.g. Clarke et al., 2021; Hassan et al., 2022). Another design factor tested in the preliminary study were the graphic warning labels. Based on the study, warning label option three was chosen. Ultimately, the different elements of the stimuli were combined and can be found below in figure 4 and figure 5.

Figure 4

Stimuli of the Beer advertisement



Stimulus 1: No textual warning/no graphic warning



Stimulus 2: Textual warning/no graphic warning



Stimulus 3: No textual warning/Graphic warning



Stimulus 4: Textual warning/graphic warning

Figure 5

Stimuli of the wine advertisement



Stimulus 1: No textual warning/no graphic warning

Stimulus 2: Textual warning/no graphic warning



Stimulus 3: No textual warning/graphic warning

Stimulus 4: Textual warning/graphic warning

3.3 Main study

3.3.1 Procedure

In order to answer the research question and to be able to draw conclusions about the hypotheses, the influence of textual and graphical warning labels has been investigated in a 2x2 between-subjects experimental design. In that design, an Instagram post has been tested with no textual warning label versus a textual warning label, and no graphic warning label versus a graphic warning label. An overview of the experimental conditions can be found in table 1.

Table 1

Representation of the experimental conditions

		Textual warnings	
		No warning	Warning
Graphic warning	No warning	1	2
	Warning	3	4

The study consists of an online questionnaire, which was created with the “Qualtrics”-Software. To test the different experimental conditions, the participants were randomly assigned to an experimental condition, when beginning the survey. The data collection took place between May 24th, 2022 and June 7th, 2022. The survey link was shared via social media and messaging services. In addition, the survey was filled in by some high school students. Since the aim was to find out the effectiveness among adolescents, the survey was restricted to people between 16 and 19 years only. However, due to the fact that alcohol is a sensitive topic and considering that the participants were rather young, the debriefing included a link to a webpage informing about alcohol and its risks. The research was granted by the Ethical Committee of the BMS faculty.

In the beginning of the survey, the informed consent was shown to the participants and they were informed about the study’s aim, the procedure, as well as for what the data is used and how it is handled. Furthermore, they were informed about their rights as participants. Finally, contact information of the researcher were mentioned for any doubts or remarks and the participants were asked for consent. If they decided not to consent, they were automatically directed to the end of the survey.

After agreeing to participate, some demographics were asked, including age, gender, daily social media consumption in minutes and the average alcohol consumption per week. Then, the stimuli were randomized and presented to the participant with a beer advertisement.

Subsequently, a multitude of statements were introduced, measuring different constructs, namely 'Attitude towards the ad', 'attitude towards the product in the ad', and 'attitude towards alcohol'. Afterwards, the stimuli were reintroduced in the context of a wine advertisement post and the statements were repeated for this post.

After the data collection, the data set was cleaned, and non-complete responses were deleted. Furthermore, the negative phrased items were recoded and to ensure the reliability of the research, a reliability analysis was conducted and the variables were adjusted accordingly. The Cronbach's Alpha used was .6 or higher.

3.3.2 Measurements

The used measurements are described in detail below. All scales used in this research were preexisting scales which were retrieved from the Marketing Scales Handbook Volume 6, Volume 7, and Volume 10.

3.3.2.1 Attitude towards the ad

The attitude towards the advertisement is measured on a 7-point Likert-Scale, with 5 items, namely 'I dislike the ad', 'The ad is appealing to me', 'The ad is attractive to me', 'The ad is interesting to me', and 'I think the ad is bad'. ($\alpha.872$)

3.3.2.2 Attitude towards the product in the ad

The attitude towards the product in the ad was also measured on a 7-point Likert-scale with four different items, namely 'I like the product in the ad', 'I feel positive toward the product in the ad', 'The product in the ad is desirable', and 'The product in the ad is good'. ($\alpha.607$)

3.3.2.3 Attitude towards alcohol

The attitude towards alcohol was measured on a 7-point bipolar scale, with the following items: The ad I just saw... 'Influences my opinion about alcohol / does not influence my opinion about alcohol', 'Changed my attitude toward alcohol / did not change my attitude toward alcohol', and 'Will change my alcohol consumption habits / will not change my alcohol consumption habits'. ($\alpha.895$)

3.3.3 Participants

In total, 171 participants filled in the survey. However, after cleaning the data, 30 responses were deleted because they were not filled out entirely or the participants did not consent to participate in the research. Hence, 140 responses remained. The participants were between 16

and 19 years old ($M=17.55$; $SD= 1.108$) and everyone spoke German, since the questionnaire was distributed in German language only. The participants used social media on average 127.34min every day ($SD=73.505$) and consume on average 2.43 alcoholic beverages every week ($SD=2.639$). A summary of the demographics per experimental condition can be found in Table 2.

Table 2

Summary of the participant's demographics

Experimental condition	Participants N	Gender		Age		Social Media usage		Alcohol consumption	
		Male N	Female N	M	SD	M	SD	M	SD
1	34	13	21	17.55	1.23	126.59	73.65	2.14	2.18
2	34	17	17	17.50	1.16	137.33	95.80	3.27	3.47
3	35	16	19	17.44	1.05	103.00	56.42	2.58	2.84
4	37	13	24	17.68	1.03	140.15	58.82	1.77	1.74
Total	140	59	81	17.55	1.11	127.34	73.51	2.43	2.64

Note: Social media usage = daily average in minutes; Alcohol consumption = Average number of cups per week.

4. Results

In the following, the results will be presented. To test the effect of the independent variables ‘textual warnings’ and ‘graphic warnings’ on the dependent variables ‘attitude towards the advertisement’, ‘attitude towards the product’, and ‘attitude towards alcohol’, a multivariate analysis of variance (MANOVA) was conducted. Although the experimental conditions remained the same for the participants, the advertisement posts differed (one beer and one wine advertisement). Thus, the analysis will be conducted twice, once for each advertisement, and the results will be presented separately.

In this analysis, the effect of textual warnings was non-significant ($F(6,127)= .790$, $p=.58$, Wilks' $\Lambda= .964$). The effect of graphic warnings resulted to be non-significant as well ($F(6,127)= .689$, $p=.66$, Wilks' $\Lambda= .968$). Ultimately, the interaction effect was also non-significant ($F(6,127)= .303$, $p=.94$, Wilks' $\Lambda= .986$). The descriptive statistics will be presented in Table 3.

Table 3*Descriptive statistics per experimental condition*

	Experimental condition							
	1		2		3		4	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Attitude towards the Advertisement (Beer)	18,79	4,32	16,06	4,92	17,00	5,68	14,78	5,32
Attitude towards the Product (Beer)	16,41	4,26	15,41	5,30	15,71	5,40	14,57	4,62
Attitude towards alcohol (Beer)	4,44	3,27	6,13	3,03	5,59	3,15	7,65	3,65
Attitude towards the advertisement (Wine)	25,18	4,76	20,47	5,64	23,17	6,34	20,22	5,48
Attitude towards the product (Wine)	17,03	4,86	14,74	5,29	17,94	4,94	15,30	4,50
Attitude towards alcohol (Wine)	4,18	2,43	5,55	2,44	5,53	2,99	6,89	2,82

4.1 Beer advertisement

4.1.1 Attitude towards the advertisement

The main effect of the textual warning on the attitude towards the advertisement was non-significant ($F(1,136)= 1.231, p= .27$). The main effect of the graphic warning on the attitude towards the advertisement was non-significant ($F(1, 136)= .657, p= .42$). The interaction effect of the textual warning and the graphic warning on the attitude towards the advertisement was non-significant ($F(1, 136)= .066, p= .79$).

4.1.2 Attitude towards the product

The main effect of the textual warning on the attitude towards the product was non-significant ($F(1,136)= .015, p= .90$). The main effect of the graphic warning on the attitude towards the product was non-significant ($F(1, 136)= .013, p= .91$). The interaction effect of the textual warning and the graphic warning on the attitude towards the product was non-significant ($F(1, 136)= .057, p= .81$).

4.1.3 Attitude towards alcohol

The main effect of the textual warning on the attitude towards alcohol was non-significant ($F(1,136)= .302, p= .58$). The main effect of the graphic warning on the attitude towards alcohol was non-significant ($F(1, 136)= .119, p= .73$). The interaction effect of the textual warning and the graphic warning on the attitude towards alcohol was non-significant ($F(1, 136)= .066, p= .79$).

4.2 Wine advertisement

4.2.1 Attitude towards the advertisement

The main effect of the textual warning on the attitude towards the advertisement was non-significant ($F(1,136)= 3.191, p= .08$). The main effect of the graphic warning on the attitude towards the advertisement was non-significant ($F(1, 136)= 1.325, p= .25$). The interaction effect of the textual warning and the graphic warning on the attitude towards the advertisement was non-significant ($F(1, 136)= .484, p= .49$).

4.2.2 Attitude towards the product

The main effect of the textual warning on the attitude towards the product was non-significant ($F(1,136)= .172, p= .68$). The main effect of the graphic warning on the attitude towards the product was non-significant ($F(1, 136)= .338, p= .56$). The interaction effect of the textual warning and the graphic warning on the attitude towards the product was non-significant ($F(1, 136)= .183, p= .67$).

4.2.3 Attitude towards alcohol

The main effect of the textual warning on the attitude towards alcohol was non-significant ($F(1,136)= 1.037, p= .31$). The main effect of the graphic warning on the attitude towards alcohol was non-significant ($F(1, 136)= .952, p= .33$). The interaction effect of the textual warning and the graphic warning on the attitude towards alcohol was non-significant ($F(1, 136)= .006, p= .94$).

4.3 Hypothesis testing and conclusions

After analyzing the data, it becomes apparent that none of the results is significant. Hence, **H₁** (*Nudges containing textual health warning messages can decrease the willingness to drink*), **H₂** (*Nudges containing graphic warning labels can decrease the willingness to drink*), and **H₃** (*There is an interaction effect between the textual warning nudge and the graphical warning nudge on the willingness to drink*) cannot be supported. Thus, both kind of warning labels failed to successfully reduce drinking intentions, and therefore, these specific warning labels are not effective in reducing the willingness to drink among German teenagers on social media. The results will be discussed in detail in the following section.

5. Discussion

This study aimed to investigate the effects of textual and graphic warnings on the drinking intention after seeing sponsored Instagram posts which contain alcoholic beverages. Therefore, posts containing warning messages were tested in a 2x2 experimental design (textual warning vs no textual warning and graphic warning vs no graphic warning). It was expected that both, textual and graphic warnings, can reduce the drinking intention. Additionally, it was expected that a combination of the textual and the graphic warning on Instagram posts have a stronger effect on the drinking intention than no or only type of warning labels. In the following parts, the results of the analysis will be discussed and practical as well as theoretical implications will be formulated. Furthermore, the limitations of this particular study will be discussed and taken into consideration.

5.1 Discussion of the results

First of all, the main effect of the textual warnings did not yield in any significant results. This is contrary to the hypothesis and to the findings of Kang and Lee (2017) who argue that textual warning messages are an effective strategy to reduce binge drinking urges, especially if loss frame messages are used. One of the reasons of why this hypothesis was rejected might be, that such warning labels were not tested in the setting of branded Instagram posts before. There is an extensive amount of research about alcohol warning labels in different settings, including studies about the negative effect of health warning video clips on drinking urges (Stautz & Marteau, 2016). However, there is little to no research done about warning labels on social media posts. Hence, it might be the case that warning labels in this particular case are less accepted than in other areas.

Another reason that the textual warnings had no significant effect on the drinking intention might be the study design and the choice of design factors. The textual warning message used in the main study, which uses a health warning, was designed in line with findings from Hassan et al. (2022) who found a general preference for health warnings over social isolation warnings and based on the results of the preliminary study, which was conducted prior to the main study. The preliminary study aimed to discover a preference for either a health or a social isolation warning and the results showed a general preference for the health warning message. However, the demographics of the participants of the preliminary study differed from the ones participating in the main study. Thus, it might be the case, that the participants who participated in the main study have generally different preferences than the participants in the preliminary study. Furthermore, only one textual health warning was tested in the preliminary

study. Hence, there is a possibility that other health related messages would have been preferred.

Secondly, the graphic warning did also yield in non-significant results. This is contrary to the findings of Wigg and Stafford (2016), who found that pictorial health warnings increased intentions to reduce or quit alcohol consumption. One of the reasons, why the hypothesis could not be supported might be the design. Although the design was tested in the preliminary study and was perceived as realistic it might be the case that a different design would have been better. Sillero-Rejon et al. (2018) argue that highly severe warnings are perceived as more effective. Thus, it might be the case that the designed warning label was lacking in severance. A different reason might be the placement of the warning label on the post. The label was placed in the corner and was rather small. Hence, the participants might have not seen the warning label, or they did not pay sufficient attention to it, as it was not centric.

Thirdly, there was no interaction effect between the textual and the graphic warning on the drinking intention. This is contrary to the findings of Vallance et al. (2017) who argue that combining both, textual and graphic warnings, may be an effective manner to ensure that labels can reach different subgroups of drinkers and that highlighting risks of alcohol consumption may increase awareness and generate discourse. There are several reasons that might explain these findings, for instance the design factors which were mentioned earlier.

However, there might also be other more general reasons why the study failed to support the hypotheses. For instance, Pechey et al. (2020) argue that health warnings can cause negative emotional arousal and reduce the desire to consume a product, and that this could be linked with an anticipated loss of pleasure. People might actively decide to ignore warnings because they do not want to lose the pleasure of consuming a certain product or it is also possible that people start to ignore labels due to over-saturation and over-usage of different types of labels in recent years.

Other explanations why the results were not relevant are more focused on the participants. First of all, the demographics of the participants of the preliminary study and the main study differ. Therefore, the participants of both studies might consume different contents and use social media more or less extensively, which might influence the results. Moreover, the participants of the main study have a rather low alcohol consumption, which could indicate that those kinds of posts are not relevant for them. One participant mentioned at the end of the survey that they have never seen such warnings and that because of that, they did not perceive the advertisement as realistic. Another participant mentioned that the design of the Instagram post itself was not realistic, and that they did not feel affected by that.

5.2 Theoretical and practical implications

After discussing the results of the study, theoretical and practical implications can be formulated. As for the theoretical implications, one of the main issues of this study which became apparent were the used health warnings. Thus, it might be interesting for future research to test different options of warnings, and whether other warnings work better than the ones used in this research. Additionally, it would be interesting to research whether the warnings placed in the posts were sufficiently noticed by the participants or not, with an eye-tracking study for instance. By doing so, it could be checked if those warning labels need to be placed in a more prominent position. Furthermore, the participants of the main study were rather of a quite specific target group. Hence, it would be interesting to look whether other groups react differently to the warnings.

Although the main effects of the study were non-significant, some practical implications can be made. As it was mentioned at the beginning of this paper, in many European countries lack in providing legislations, when it comes to alcohol advertising online and on social media, and children and adolescents are exposed to the content without any warning mechanism. This study tried to discover and provide some kind of solution to the issue, however, failed to deliver significant results. Regardless, some sort of legislation or warning mechanism regarding the advertising of alcoholic beverages are necessary, to inform and protect the general public, but especially vulnerable groups, as self-regulatory codes of the industry appear to be non-sufficient. This is something that organizations, for instance the World Health Organisation, have been demanding for a long time (WHO, 2021). However, these demands have been ignored up until now.

5.3 Limitations

After discussing the results of the study, it is also important to take the limitations into consideration. First of all, one of the limitations is the setting in which the study took place. Since this study was a reactive study design in a staged setting, and the participants are informed prior to filling in the survey, they are aware of the aim of the study, which has impacts on the response behavior of the participants. Another issue related to the study setting might have been the post itself. As only screenshots of the Instagram posts were provided, and the participants were not able to actually see it on Instagram, which might have appeared as less realistic to the participants.

Another limitation of the study was the country of origin of the participants. Although Germany was chosen on purpose, it only gives insights into one country. Considering, that the

advertisement of alcoholic beverages is an issue in most parts of the world, the attitude towards warning labels in other countries was not measured. It might be the case, that those warnings work better in other countries. This is something, further research might focus on in the future.

A different limitation of this study is the number of participants. Although the initial data set had 171 participants, 31 responses had to be completed due to not finishing the questionnaire or not consenting to the use of the data. Although the 171 initial participants would have been sufficient, more participants would have led to richer and more detailed data. Furthermore, because some answers could not be used for analysis, the number of participants per experimental condition was unequal.

Ultimately, the design of the manipulations of the different experimental conditions is another limitation of the study, which was also mentioned earlier in the discussion of the results. Although the different manipulations were tested in the preliminary study, it became apparent that the designed manipulations were not always perceived as intended. Thus, if different manipulations were tested and used, it might have had influences on the outcome of the study.

6. Conclusions

The aim of this study was to discover the effects of textual and graphic health warnings on Instagram, in particular on alcohol related and branded posts. Therefore, different alcohol posts, containing a beer and a wine advertisement, were designed and tested in a 2x2 experimental design (Textual warning/ no textual warning vs. graphic warning/ no graphic warning). The study aimed to answer the research question: *“What is the effect of textual and graphic health warning labels applied to branded social media posts on the Willingness to Drink among German adolescents aged between 16 and 19?”*.

To answer the research question, there were no effects of textual and graphic warning labels applied to branded social media posts on the Willingness to Drink among German adolescents aged between 16 and 19. Nonetheless, health warning labels on food, tobacco products, or alcohol keep playing an important role in informing about products and in trying to reduce unhealthy behaviors. And although, there were no effects in a social media setting, solutions for the issue at hand must be found, to protect the most vulnerable. Therefore, the effects of health warnings in a social media setting are yet to be discovered and researched.

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Appendix A

Instagram advertisement posts



The image shows an Instagram post from the user 'jermanos'. The post features a photograph of four people on a beach. A woman in the foreground is playing an acoustic guitar and holding a beer. Another woman next to her is also holding a beer. In the background, a man is holding a beer and looking towards the camera. The scene is set outdoors with a clear blue sky and a bright sun. The Instagram interface is visible, including the top bar with the 'Instagram' logo and a '+0' icon, the user profile 'jermanos', and the bottom navigation bar with icons for home, search, post, heart, and profile.

Instagram +0

jermanos ...

♥️ 💬 Gefällt 25,354 Mal

jermanos An unserem Lieblingsstrand mit unserem Lieblingsbier @Jakob'sPilsen 🍻🍻
#Urlaub #genießen #bier #jakobspilsen #Werbung



The image shows an Instagram post from the user 'Just_chris'. The post features a photograph of a group of people outdoors, likely at a vineyard or winery. A man in the foreground is taking a selfie, holding a glass of red wine. Behind him, several other people are also holding glasses of wine and smiling. The setting is outdoors with trees and a wooden deck. The Instagram interface is visible, including the top bar with the 'Instagram' logo and a '+0' icon, the user profile 'Just_chris', and the bottom navigation bar with icons for home, search, post, heart, and profile.

Instagram +0

Just_chris ...

♥️ 💬 Gefällt 10,498 Mal

Just_chris Den Urlaub genießen mit Freunden und @Weingut_Müller 🍷🍷
#Urlaub #genießen #wein #vino #MüllerWein #Werbung

Appendix B
Graphic warning labels



Appendix C

Literature search

Literature search log

Date	Database	Search string	Total hits	Comments
March 15th	Scopus	"Alcohol marketing" AND "social media"	53	
March 15th	Scopus	"Nudging" AND "alcohol consumption"	8	Not relevant
March 17th	Scopus	"Nudging" OR "alcohol consumption" AND "social media" + Years from 2020- 2022	280	Partially related articles but also irrelevant articles
March 17th	Scopus	"Nudging" AND "Social Media"	53	
March 18th	Scopus	"Digital nudging"	74	Not relevant
March 18th	Scopus	"Nudg*" AND "Warning"	48	
March 19th	Scopus	"Warning messages" AND "alcohol" OR "alcohol consumption"	34	
March 19th	Scopus	"Health warnings" AND "alcohol consumption"	117	
May 9th	Web Of Science	"Health warning labels"	254	
May 16th	Scopus	"Graphic warning labels"	117	
May 16th	Web Of Science	"Graphic warning labels"	2	

