

**Individual differences in attentional
processing of responsible drinking statements
in alcohol packaging, public health campaigns
and alcohol advertising among alcohol
consumers**

Thesis submitted in accordance with the requirements of the University of Liverpool for the
degree of Doctor in Philosophy by Inge Kersbergen

November 2016

Declaration

No portion of this work has been submitted in support of any other application for degree or qualification at this or any other University or institute of learning

Acknowledgements

I'd like to acknowledge the UK Centre for Tobacco and Alcohol Studies for funding my PhD project. I want to thank my supervisory team for their help and support. Matt, thank you for giving me the freedom to do the research I wanted to do. I really enjoyed this PhD and your advice and incredibly fast feedback has been so helpful. Thank you very much! Eric, thanks for pretending to be Matt when he was away. Also thank you for giving me the opportunity to gain teaching experience on the side, I really appreciated this. Also a big thank you to my family and friends for their love and support. I hope I've made you proud. Dave, thank you for putting up with me when I was stressed out and being a life line to the real world. Simone, je bent een enorme steun voor me geweest de laatste jaren. Je bent mijn beste vriendin en ik had dit niet zonder jou willen doen! Shout out to all the inhabitants of office 2.19 over the years. You've been the best office mates I could have imagined and you've made this all so much better. I miss you all loads! Jay, you were a fantastic conference travel buddy. I'm still impressed that we made it to Edinburgh. Thank you for your company and friendship. Melissa, thank you for keeping me sane and talking me out of so many panics. You're an amazing person and I'm so glad we met! Oly and Ewan, our PhD support coffees were something to look forward to when I didn't think I'd ever finish this thesis. Thank you for all your kind words and distractions. Papa, mama en Esther, als ik met jullie skype/bel voel ik me altijd weer een beetje thuis. Dankjewel voor alle hulp in de afgelopen jaren. Barbara, Ian, Laura, Grom and Charles, you've made me feel so welcome. Thank you for being my family when my own family is so far away.

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Individual differences in attentional processing of responsible drinking statements in alcohol packaging, public health campaigns and alcohol advertising among alcohol consumers

Inge Kersbergen

Abstract

We live in an environment in which alcohol is easily available and widely marketed. Alcohol advertising has been shown to increase long-term and short-term alcohol consumption. On the other hand, governments and industry use warning labels and public health campaigns to inform the public of the harmful effects of alcohol in an attempt to reduce alcohol-related harm. There is not much evidence that labels and campaigns affect drinking behaviour, but evidence from other domains suggests that individual differences in attentional processing might moderate effects on behaviour. In this thesis, I tested the general hypothesis that individual differences in visual attention to alcohol cues and responsible drinking statements would underlie the effect of alcohol-related mass persuasion attempts (i.e., alcohol advertisements, warning labels and public health campaigns) on drinking behaviour and its antecedents, in young adult alcohol consumers. The secondary aim of this thesis was to examine the direct effect of alcohol-related mass persuasion attempts on drinking intentions and alcohol consumption shortly after exposure. To study this, I first conducted a cross-sectional study and a between-subjects experimental study to investigate attention to warning labels on alcohol packaging and examine whether priming participants to direct their attention to warning labels would prompt them to intend to drink less alcohol. Findings suggested that existing UK warning labels did not attract substantial attention and the amount of attention that participants directed to them did not affect their drinking intentions (Chapter 2). I subsequently conducted three experimental studies to examine to what extent novel warning labels would capture attention and affect willingness to pay for alcohol. Findings showed that novel warning labels

did not attract more attention than existing warning labels, nor did they significantly influence willingness to pay for alcohol (Chapter 3). With regard to televised alcohol advertisements, I conducted a between-subjects experiment in a semi-naturalistic environment to investigate whether alcohol advertising affected proximal alcohol consumption in a brand-specific or general manner. Results suggested that alcohol advertising did not affect drinking behaviour, however methodological limitations mean that these findings should be interpreted with caution (Chapter 4). Next, I conducted two experimental studies to examine how individual differences in visual attention to alcohol cues and responsible drinking statements in alcohol-related television adverts predicted drinking intentions and proximal alcohol consumption. Findings showed that attention to responsible drinking statements did not predict drinking intentions or immediate alcohol consumption, but visual attention to alcohol portrayal (an actor sipping alcohol) in alcohol advertising predicted increased alcohol consumption in the laboratory (Chapter 5).

Overall, these findings demonstrate that responsible drinking statements/labels attract limited attention and that increased attention to these labels does not prompt alcohol consumers to intend to reduce their drinking. I found no evidence that alcohol-related persuasion affected immediate alcohol consumption or drinking intentions, but attentional processing of alcohol portrayal in alcohol advertising was associated with increased alcohol consumption shortly after exposure to the adverts. Finally, I conducted a focus group study to explore subjective evaluations of current warning labels and responsible drinking adverts. Findings showed that participants did not consider warning labels/adverts to be personally relevant and that they mistrusted the message source. Instead, participants suggested that warning messages focussing on alcohol-related harm (to themselves or others) might be more persuasive. Combined with the findings from the laboratory studies, these findings suggest responsible drinking statements could attract more attention if their content and format were changed. The

findings reported in this thesis further our understanding of the role of attention in alcohol-related persuasion. In line with recently published evaluations of public health campaigns and warning labels, these studies suggest that warnings in alcohol advertising and on packaging in their current form have little scope for changing drinking behaviour. Instead, it might be more fruitful to increase the noticeability of warning labels and impose restrictions on alcohol marketing and/or the visual content used within alcohol marketing.

Chapter 1

General introduction

1.1 Alcohol-related harms

Alcohol is widely consumed across the world. It has been estimated that 43% of adults globally and 88.2% of adults in Western Europe consumed any alcohol in the twelve months prior to measurement (Gowing et al., 2015). Compared to the European average, the United Kingdom (UK) has greater per capita alcohol consumption and a higher prevalence of heavy episodic drinking (World Health Organisation, 2014). In England, 58% of people aged 16 years or older reported drinking alcohol in the previous week and 5% drank more than 14 UK units (1 UK unit = 8g of ethanol) on their heaviest drinking day (Health & Social Care Information Centre, 2016). In the UK, 33.4% of alcohol consumers engaged in heavy episodic drinking (consumption of at least 60 grams of ethanol (7.5 UK units) on at least one single occasion in the previous month; World Health Organisation, 2014, p. 246). Alcohol contributes to 3.8% of global deaths and 4.6% of disability-adjusted life-years (DALYs), making it one of the biggest avoidable risk factors for premature death and illness (Rehm et al., 2009). Alcohol consumption has been identified as a direct cause of more than 30 diseases and a component cause (i.e., a cause of disease in combination with other component causes, but not a cause in itself) of more than 200 diseases, injuries and other health conditions, such as cancers, neuropsychiatric conditions, gastrointestinal diseases, some cardiovascular diseases, and foetal alcohol syndrome (Rehm et al., 2009). For the majority of alcohol-attributable diseases and injuries, there is a dose-response relationship. For instance, a greater volume of alcohol consumption is associated with greater risk of all alcohol-attributable cancers (Shield, Parry, & Rehm, 2013) and reports showed that any alcohol consumption (even at low levels) is associated with greater

risk of cancer of the lip, oral cavity, pharynx, oesophagus and breast (International Agency for Research on Cancers, 1988, 2010, 2012). In addition to overall volume consumed, the number of drinks per drinking occasion is also a risk factor for alcohol-related harm. Heavy episodic drinking (or binge drinking) is associated with increased likelihood of experiencing alcohol-related harms (Antai, Lopez, Antai, & Anthony, 2014). Therefore, the UK government introduced lower-risk guidelines to not regularly exceed 2-3 UK units (for women) or 3-4 UK units (for men) per day (Department of Health, 1995). The guidelines were recently updated, and since January 2016 the UK government recommends that both men and women should not exceed 14 UK units of alcohol per week (Department of Health, 2016a). This change reflects new evidence that emerged in the last 20 years on alcohol-related health risks (as discussed earlier in this paragraph) and as a response to findings that suggested that daily drinking guidelines might be inappropriate, because the majority of the UK population drinks on no more than two days per week (Boniface & Fuller, 2012).

Alcohol consumption does not only pose risks to the alcohol consumer themselves, but also to people around them. Alcohol-related harm to others includes physical harms such as drink driving and assault, financial harm such as workplace absenteeism, but also emotional harm (Room et al., 2010). For example, being in a personal relationship with a heavy drinker is associated with reduced personal wellbeing (Casswell, You, & Huckle, 2011). The prevalence of experienced harm from other people's drinking is high. Across a range of national surveys, prevalence ranged from 28% (Ireland) to 71% (New Zealand) of respondents reporting experiencing harm from someone else's drinking (Australia: Laslett et al., 2011; Ireland: Hope, 2014; New Zealand: Casswell, Harding, You, & Huckle, 2011; USA: Greenfield et al., 2014). Variability in the resulting prevalence statistics are likely due to the measures used in each survey. Some surveys only measured five types of alcohol-related harm (Hope, 2014), whereas others measured up to 24 types of harm (Casswell, Harding, et al., 2011).

Commonly measured experiences of harm were road-traffic accidents caused by a drunk driver, physical assault, relationship problems due to alcohol, and financial problems due to alcohol. A survey conducted in Scotland and the North-West of England measured the prevalence of 16 (Scotland survey) to 20 (NW England survey) types of harm from others' drinking (Gell, Ally, Buykx, Hope, & Meier, 2015). Results showed that 51.4% (Scotland) and 78.8% (NW England) of respondents experienced at least one form of harm from others' drinking in the previous year, and 35.6%/67.7% experienced two or more forms of harm, respectively.

Considering the risks of alcohol-related harm to alcohol consumers and the people around them, alcohol misuse is associated with considerable cost for national governments and health services. Almost 1 million alcohol-related violent crimes were reported in England and Wales in 2010/11 (Chaplin, Flatley, & Smith, 2011) and an estimated 1.1 million alcohol-related hospital admissions were reported in England in 2014/15 (Health & Social Care Information Centre, 2016). In their alcohol strategy, the UK government estimated that "in a community of 100,000 people, each year 2,000 people will be admitted to hospital with an alcohol-related condition; 1,000 people will be a victim of alcohol-related violent crime; over 400 11-15 year olds will be drinking weekly; over 13,000 people will binge-drink; over 21,500 people will be regularly drinking above the lower-risk levels; over 3,000 will be showing some signs of alcohol dependence; and over 500 will be moderately or severely dependent on alcohol." (HM Government, 2012, p. 9). They also estimate that alcohol costs UK society £21 billion every year. Even though total UK alcohol consumption per capita declined between 2000 and 2013, the number of alcohol-related hospital admissions increased during that time period. In England, there was a 3% increase in alcohol-related hospital admissions compared to 2013/14 and an almost 50% increase compared to 2004/05 – although some of this increase can be attributed to improved record keeping (Health & Social Care Information Centre, 2016).

1.1.1 Alcohol consumption in University students

University students are particularly at risk of alcohol-related harm. Students display more hazardous drinking patterns than their non-student peers (Kypri, Cronin, & Wright, 2005), which is associated with increased risk of alcohol-related harms, such as acute alcohol-induced amnesia (blackouts), alcohol overdoses and sexual assault (White & Hingson, 2013). In a recent review, Davoren, Demant, Shiely, and Perry (2016) found that 62-84% of university students in the UK and Ireland engaged in hazardous alcohol consumption and that 70-85% engaged in binge drinking behaviour. Longitudinal research showed that UK students' reduced their alcohol consumption as they progressed in their studies, however students whose alcohol consumed exceeded the low-risk guidelines in Year 1 were also more likely to drink in excess of the guidelines in subsequent years, compared to students who remained within the guidelines (Bewick et al., 2008). Another study showed four distinct clusters of student drinkers: Light drinkers (including abstainers); drinkers who consumed alcohol approximately twice a week, but binged on these occasions; drinkers who consumed alcohol on most days of the week, but binged less than once a week; and drinkers who consumed alcohol on most days of the week and binged on most of those occasions (Craigs, Bewick, Gill, O'May, & Radley, 2012). Apart from the light drinkers (26% of the sample), nearly all of the students in the remaining drinking clusters exceeded the guidelines for lower-risk alcohol consumption, increasing their risk of alcohol-related harm.

1.2 Alcogenic environment

Why does a large proportion of the population drink at a level that increases their risk of alcohol-related harm? One contributing factor is an environment that promotes and facilitates (excessive) alcohol consumption (Huckle, Huakau, Sweetsur, Huisman, & Casswell, 2008). Alcohol in the UK is cheap, widely available, and heavily marketed, three factors that

are associated with increased alcohol consumption, as I will discuss in this section. Some scholars have used the term ‘marketing’ to refer to brand/product promotion (e.g., Gordon, Mackintosh, & Moodie, 2010), whereas others use the term more broadly, encompassing pricing and availability as well as promotion (e.g., Hastings, Anderson, Cooke, & Gordon, 2013). In this thesis, I will use ‘marketing’ to mean brand/product promotion.

1.2.1 Price

Alcohol is relatively cheap and easily affordable in the UK. Kan and Lau (2013) calculated the affordability of alcohol across 65 cities worldwide, including London, UK. Alcohol affordability was operationalized as the proportion of the median daily income of low income occupations that was required to purchase a bottle of low priced whisky. Their results showed that alcohol was highly affordable (i.e., a bottle of low priced whisky cost less than twice the daily income of low income occupations) in the majority of the included cities (58, 89%). London ranked 25th out of 65, with a bottle of low priced whisky costing 40% of the daily income of low income occupations. Recent national statistics support the findings that alcohol is highly affordable in the UK. The UK Alcohol Health Alliance (2016) reported that a large range of alcohol products for sale cost less than £0.25 per UK unit, with the cheapest alcohol being sold for £0.16 per UK unit. This means that the weekly guideline of 14 units for lower-risk drinking can be purchased for as little as £2.25. Additionally, the Health & Social Care Information Centre (2016) reported that alcohol in the UK has become 2% more affordable since 2005.

The price of alcohol is directly linked to alcohol demand and alcohol consumption. A decrease in the purchase price of alcohol is associated with increased demand for the alcohol product, whereas a price increase is associated with decreased demand (Jiang, Livingston, Room, & Callinan, 2016). A meta-analysis demonstrated a significant negative relation

between the price and taxation levels of alcohol and measures of alcohol sales and consumption (Wagenaar, Salois, & Komro, 2009). A reduction in the price/taxation of alcohol was associated with greater total alcohol consumption, but also with greater beverage specific consumption (i.e., lower beer prices were associated with greater beer consumption). In addition to an effect of alcohol affordability on alcohol consumption, research has also demonstrated that cheaper alcohol is associated with greater alcohol-related harms. Herttua, Mäkelä, and Martikainen (2008) found a substantial increase in alcohol-related mortality in Finland after a systematic reduction in the retail price of alcohol (ranging from a 3% reduction in wine prices to a 36% reduction in the price of spirits), due to a change in taxation law. This increase in alcohol-related mortality was especially marked in populations that were already at a higher risk, such as people with a low socioeconomic status (SES).

1.2.2 Availability

Alcohol in the UK is not only cheap, but it is also widely available. In 2014, 168,600 premises in the UK were licensed to sell alcohol: 37,700 were licensed for on-trade sales (i.e., sales of alcohol for the purpose of consumption on the premises), 52,400 were licensed for off-trade sales (i.e., for consumption at a different location – e.g., supermarkets), and 78,500 were licensed for both on-trade and off-trade (Home Office, 2014). Research has shown that the number of alcohol outlets (on-trade and off-trade) is associated with increased alcohol consumption and alcohol-related harms. For example, Scottish adolescents who lived in close proximity to alcohol off-trade premises or lived in areas with high off-trade density (i.e., a large number of premises per square mile) consumed more alcohol than adolescents who lived further away or in lower density areas. However, proximity to on-trade premises or on-trade density was not associated with adolescent alcohol consumption (Young, Macdonald, & Ellaway, 2013). Similarly, the rate of alcohol-related hospitalisations and mortality in Scottish

cities was higher in areas with high outlet density than in areas with lower outlet density and seemed to be particularly due to increased off-trade density (although on-trade and off-trade density could not be completely disentangled in this study; Richardson, Hill, Mitchell, Pearce, & Shortt, 2015). In Australia, off-trade density was positively associated with alcohol use disorders, whereas on-trade density was associated with assault rates (Livingston, 2011). On-trade density was also associated with alcohol-impaired driving, as one study showed that the risk of alcohol-related road accidents was higher in areas that were within close proximity to areas with a high number of bars per square footage (Morrison, Ponicki, Gruenewald, Wiebe, & Smith, 2016). A recent review found that, whilst there was an overall association between outlet density and alcohol consumption and alcohol-related harms, the evidence regarding the effect of specific types of alcohol outlet density (e.g., bars, restaurants, liquor stores) was mixed and contradictory at times (e.g., sometimes bars were most predictive of violence, but other times liquor stores or clubs were most predictive; Gmel, Holmes, & Studer, 2016). So, while the evidence suggests that increased alcohol availability through licensed premises is associated with increased alcohol consumption and harm, any conclusions regarding the effect of specific types of alcohol outlets should be treated with caution.

1.2.3 Marketing

In addition to the wide availability of alcohol and its low price, alcohol is also widely marketed in the UK. Almost all adolescents (97%) in a Scottish survey reported that they had been exposed to at least one form of alcohol marketing (Gordon et al., 2010). In a recent study that analysed exposure to televised alcohol advertisements across three European countries, Patil, Winpenny, Elliott, Rohr, and Nolte (2014) demonstrated that UK adolescents (aged 10-15) were significantly more exposed to alcohol marketing than UK adults per hour of television viewing. This difference was especially strong for ‘alcopop’ advertisements (sweetened

alcoholic beverages), with a 51% increase in exposure compared to adults. In a similar vein, in 2011/12 researchers counted an average of almost two alcohol references per minute of televised English football matches (A. Graham & Adams, 2014), and an average of 1.24 alcohol references per minute of televised UEFA European championship football matches (Adams, Coleman, & White, 2014), both which are viewed by many young people.

Research suggests that alcohol advertising increases long-term alcohol consumption among adolescents. Two systematic reviews of longitudinal studies that investigated the effect of exposure to alcohol advertising on adolescent drinking showed that increased exposure to alcohol advertisements consistently predicted earlier onset of drinking, and higher levels of alcohol consumption and binge drinking behaviour among adolescents (Anderson, de Bruijn, Angus, Gordon, & Hastings, 2009; Jernigan, Noel, Landon, Thornton, & Lobstein, 2016). The studies included in these systematic reviews used a range of methods to estimate exposure to alcohol advertising, such as self-reported TV viewing behaviour, advertisement liking, and engagement with alcohol marketing. They also used a range of outcome measures, such as onset of drinking, recent alcohol consumption, and alcohol-related problems. This suggests that exposure to alcohol advertising has a robust effect on adolescent drinking behaviour that does not depend on study methodology.

The longitudinal effect of alcohol advertising on adult alcohol consumption has not been investigated, but laboratory research has shown an acute effect of exposure to alcohol advertising on alcohol consumption in adults. A recent meta-analysis found that exposure to alcohol advertising (compared to non-alcohol advertising) led to a small increase in the volume of alcohol consumed in the laboratory (Stautz, Brown, King, Shemilt, & Marteau, 2016). However, the meta-analysis had some important limitations. Firstly, the sample size was very small. Only seven studies (a total of 758 individual observations) experimentally investigated the effect of alcohol advertising on immediate alcohol consumption. Secondly, the studies

varied in the methodology that they used. Most studies embedded the alcohol advertisements in a television programme/movie and measured the amount of alcohol consumed during the programme. However, some studies also experimentally manipulated the alcohol-related content of the television programme and one study used the amount of alcohol consumed in a bogus taste test¹ as the outcome measure. Finally, all studies investigated the effect of alcohol advertising on immediate alcohol consumption in a social context (i.e., multiple participants viewing the programme at the same time). Other research has demonstrated that individuals' alcohol consumption in a social context is strongly influenced by the alcohol consumption of their drinking partners (Dallas et al., 2014; Larsen, Overbeek, Granic, & Engels, 2012, 2010). Therefore, researchers should control for similarities between participants in the same testing session. However, only two studies controlled for data clustering within testing sessions and the meta-analysis also did not control for clustering in the data. As a consequence, they may have overestimated the effect of alcohol advertising on immediate alcohol consumption.

The individual studies in the meta-analysis suggest that alcohol advertising might not affect immediate alcohol consumption for all alcohol consumers or under all circumstances. For example, Koordeman, Anschutz, and Engels (2011) only found a significant effect of alcohol advertising among heavy weekly drinkers (defined as more than 7 standard drinks (54g of ethanol) per week) and not for light drinkers (participants who consumed less than 7 standard drinks in a week). Two other studies (Kohn & Smart, 1987; Wilks, Vardanega, & Callan, 1992) demonstrated that the number of alcohol advertisements influenced immediate alcohol consumption, with moderate amounts of advertising leading to more alcohol consumption than high amounts of advertising, suggesting that the dose-response relation between alcohol advertising and acute alcohol consumption follows an inverted U shape. The other studies

¹ A bogus taste test is an unobtrusive way of measuring alcohol consumption. Participants are asked to rate the taste of one or more alcoholic drinks and are led to believe that the researcher is solely interested in these taste perception ratings, when in reality, researchers are interested in how much alcohol the participant consumes during the taste test.

found no overall effect of advertising on immediate alcohol consumption (Kohn & Smart, 1984; Koordeman, Anschutz, & Engels, 2012), although Kohn and Smart (1984) did find a significant effect in the first half hour after exposure. Taken together, these findings suggest that there might be other variables that are facilitate/reduce the effect of alcohol advertising on adult alcohol consumption in the laboratory, such as drinking habits or the presence of alcohol consuming peers. However, this has not been systematically researched yet.

Considering that most research into the effects of alcohol advertising on long-term alcohol consumption has focussed on adolescents' alcohol consumption, there is little research investigating whether exposure to alcohol advertising is associated with alcohol-related harm. In fact, only one study to date has directly studied the link between alcohol advertising and alcohol-related harm: R. C. Smith and Geller (2009) compared the prevalence of alcohol-related single-vehicle traffic fatalities (e.g., collision with a tree) among 15-20 year old drivers in US states that have a law that bans alcohol marketing targeting minors, with the prevalence in states that do not have an advertising ban. Their results showed that the prevalence of alcohol-related single-vehicle fatalities among drivers below the legal drinking age was significantly lower (a 32.9% decrease) in states that banned alcohol marketing that targets minors. However, as no other research has been conducted into the effect of alcohol marketing on experienced alcohol-related harm, one cannot draw any conclusions about the extent of the effect on other alcohol-related harms.

1.2.3.1 The effect of marketing on eating and smoking behaviour

Because the literature on alcohol marketing is focussed on adolescent alcohol consumption, I will expand on parallels with the marketing of other unhealthy consumer behaviours, such as smoking, and consumption of energy-dense low-nutrition foods. Similar to the literature on alcohol advertising, the literature on the effect of tobacco and food advertising is concerned with its potential effect on children's and adolescents' eating and

smoking behaviour. In 2011, a Cochrane review that included 19 longitudinal studies found that awareness of tobacco advertising and engagement with tobacco advertising increased the likelihood that an adolescent who was a non-smoker at baseline would have experimented with smoking or have become a smoker at follow-up (Lovato, Watts, & Stead, 2011). Similarly, greater exposure to food advertising was associated with poor diet among children (Kelly et al., 2016). Similar to alcohol advertising, food advertising has also been shown to increase food consumption shortly after exposure to the adverts. A meta-analysis of randomized controlled trials (RCTs) demonstrated that exposure to unhealthy food and non-alcoholic beverage marketing increased children's preference for and intake of energy-dense, low-nutrition products shortly after exposure to advertisements (Sadeghirad, Duhaney, Motaghipisheh, Campbell, & Johnston, 2016). Another meta-analysis also included experimental studies that investigated the effect of advertising on food consumption in adults (Boyland et al., 2016). In a sub-group analysis they demonstrated that food advertising only significantly affected consumption in children, but not in adults. The authors argue that this difference may be due to adults' understanding of the persuasive intent behind the advertisements and their ability to critically evaluate them. It would not be ethical to study the effect of alcohol advertising on children's and adolescents' immediate alcohol consumption, but the findings by Boyland et al. (2016) suggest that the effect of alcohol advertising could be greater for adolescents than adults.

1.3 Alcohol policy

The UK government has introduced various policy measures to tackle alcohol-related harm and reduce population alcohol consumption that exceeds the guidelines for low risk alcohol consumption (Department of Health, 2013), in addition to existing alcohol legislation. Current legislation prohibits the sale of alcohol to someone under 18 ("Alcohol and young people," 2016), drink-driving ("The drink drive limit," 2016), and alcohol marketing that a)

targets people under 18, b) links alcohol with social/sexual success and irresponsible behaviour, or c) shows alcohol being served irresponsibly (Advertising Standards Authority, n.d.). The government's policy measures include some population level policies and policies that target individuals who are at risk of alcohol-related harm. Policies that target individuals include an alcohol risk assessment in the NHS health check for adults aged 40 to 75, spending £448 million on improving the lives of the 120,000 most troubled families in the country (many of which have alcohol-related problems), developing a model to give young people who go to Accidents & Emergencies (A&E) with an alcohol-related problem more appropriate follow-up and care, and employing alcohol liaison nurses at hospitals. The government have also launched a drug and alcohol recovery pilot programme to improve alcohol dependence treatment. Among the population level policies, the government uses public health campaigns to inform people about the risks of exceeding the lower-risk guidelines, provides tools and tips to help people to reduce their drinking, and is working with the Advertising Standards Agency (ASA) to further restrict alcohol marketing to underage drinkers. It also collaborates with the alcohol industry to encourage a culture of responsible drinking through the Public Health Responsibility Deal (hereafter referred to as "the responsibility deal") and it recently reviewed the lower-risk alcohol guidelines to empower the public to make responsible and informed choices about their drinking (Department of Health, 2016b).

As part of the responsibility deal, the alcohol industry has committed to 1) provide warning labels on alcohol packaging that provide unit information, lower-risk drinking guidelines and a pregnancy warning; 2) provide simple and consistent information in the on-trade and off-trade to raise public awareness and explore with health bodies how messages around drinking guidelines and the associated harms might be communicated; 3) prevent under-age sales of alcohol; 4) provide financial support for Drinkaware (industry sponsored non-governmental organisation (NGO)), public health campaigns, local policy schemes, and

Lifeskills Education and Alcohol Foundation (LEAF; a charity that provides education to young people to empower young people to make safe decisions about alcohol); 5) develop a new marketing/sponsorship code that restricts alcohol marketing around schools and adheres to the Drinkaware brand guidelines; and 6) remove 1 billion units from the market through improving consumer choice of lower alcohol products (e.g., by introducing new lower alcohol products, ensuring that lower alcohol products receive greater marketing and/or in-store (price) promotion, or reducing serving sizes; Department of Health, 2011).

1.4 Is there any evidence that these policy measures have beneficial effects on alcohol consumption and alcohol-related harm?

The majority of the policy measures described rely on the assumption that people behave rationally and therefore will adjust their behaviour in response to good information about the consequences of alcohol use. However, as I will describe in this section, the evidence-base for these information-based policies is weak. First, I will discuss research on the effectiveness of alcohol warning labels and public health campaigns and related findings from the tobacco literature. This will be followed by a discussion of the potential impact of the alcohol industry's involvement in label and campaign design. Finally, I will argue that strong public support for information-based policies might drive governmental focus on these types of policies, despite evidence that other types of policies might be more effective.

1.4.1 A note on terminology

The terminology for alcohol-related warning messages used on alcohol packaging and in mass-media campaigns varies widely in the current literature. For the sake of clarity, I will outline the terms used in this thesis and what they will refer to.

1.4.1.1 Warning labels on alcohol packaging

“Alcohol warning labels” will refer to labels that include some form of informational statement about the normative use of the product (e.g., responsible drinking statements, government guidelines for low risk consumption) or risks associated with alcohol consumption.

1.4.1.2 Public health campaigns

“Public health campaigns” will refer to (mass-)media communications that include some form of informational statement about the normative use of alcohol (e.g. responsible drinking statements, government guidelines for low risk consumptions) or risks association with alcohol consumption. Public health campaigns can either encourage a change in drinking behaviour (e.g., moderate drinking or abstinence) or encourage a change in (or raise awareness of) behaviour when under the influence (e.g, drinking and driving). Where necessary, I will distinguish between these types of campaigns.

In this thesis, I will use the term public health campaign for any commercial that is not visibly sponsored by the alcohol industry. Therefore, commercials by industry-sponsored organisations as Drinkaware (UK) or Drinkwise (Australia) will be referred to as public health campaigns, but brand/product adverts that have a focus on responsible drinking or responsible behaviour while under the influence of alcohol will not be called public health campaigns.

1.4.1.3 Responsible drinking messages

“Responsible drinking messages” will refer to messages in warning labels and public health campaigns that encourage a change in behaviour. This includes “drink responsibly” statements, but also statements that encourage alcohol consumption at a slower pace, or encourage drinking non-alcoholic drinks.

1.4.2 Warning labels and public health campaigns

1.4.2.1 Warning labels on packaging/within advertisements

Alcohol warning labels are typically displayed in three locations: on alcohol packaging, within alcohol advertising, or at point-of-sale (Claire Wilkinson & Room, 2009). Alcohol warning labels on alcohol packaging are mandatory in several countries (i.e., Argentina, Bolivia, Brazil, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, France, Germany, Guatemala, Honduras, Indonesia, Kenya, Republic of Korea, Malaysia, Mauritius, Mexico, Mozambique, Nicaragua, Peru, Russian Federation, Slovenia, South Africa, Thailand, Togo, Turkey, United States of America, Uzbekistan, and Zimbabwe) and voluntary in others (i.e., Australia, Chile, China, Japan, and the United Kingdom) (International Alliance for Responsible Drinking, 2016). These labels contain messages that vary widely. US warning labels, for example, focus on the risk of drinking during pregnancy and drink driving. On the other hand, labels in Australia and the UK state the amount of standard drinks in the container, in order to assist alcohol consumers who wish to stay within recommended limits (which are also displayed on the UK warning), but these labels do not communicate alcohol-related risks.

The effectiveness of alcohol warning labels has been studied extensively and several researchers have reviewed the available evidence. Stockley (2001) synthesized the evidence on the effectiveness of alcohol health warnings that have been implemented in the US. She showed that the implementation of warning labels in the US increased awareness of the existence of the label itself and the message on the label, but did not increase perception of risks associated with drinking during pregnancy or drinking and driving. Additionally, introducing pregnancy warnings did not decrease the proportion of pregnant women regularly drinking alcohol in excess, and the introduction of drink-driving warnings did not decrease the prevalence of drinking and driving. Similarly, Celia Wilkinson et al. (2009) reviewed the available

longitudinal and cross-sectional evidence across multiple countries to assess the effect of alcohol warning labels on five outcomes: Consumer awareness of the label, consumer comprehension of the message, recall of the message, impact on consumer beliefs, and behavioural compliance (i.e., whether consumers adjusted their behaviour according to the information on the label). They concluded that there is reasonable evidence that alcohol warning labels effectively increase consumer awareness of the label and recall of its message, but there is insufficient evidence that warning labels increase risk perceptions or prompt alcohol consumers to limit their alcohol consumption.

1.4.2.2 Public health campaigns

Research into the effectiveness of alcohol-related public health campaigns² is mixed. Compared to warning labels, public health campaigns are more costly to implement and typically run for a limited amount of time (similar to brand advertising campaigns). Public health campaigns vary widely in the type of information they provide, the alcohol-related risk they focus on (Andsager, Austin, & Pinkleton, 2001) and the persuasive tools they use to communicate their message (DeJong & Atkin, 1995; Lavack, 2008). As a result, one should be cautious when generalizing evaluations of one campaign to other campaigns. A broad distinction can be made between campaigns that aim to reduce population-level alcohol consumption and campaigns that aim to reduce alcohol-related road traffic accidents. The literature indicates that public health campaigns regarding driving under the influence of alcohol are generally effective, but public health campaigns promoting responsible drinking have less clear-cut results. I will discuss the evidence for both types of campaigns below.

1.4.2.2.1 Drink driving campaigns

A review paper showed that mass media campaigns targeting alcohol impaired driving lead to a reduction in the prevalence of alcohol impaired driving and alcohol-related road-

² In the literature also referred to as: responsible drinking adverts, Public Service Announcements (PSAs)

traffic accidents (Elder et al., 2004). Similarly, a social norms marketing campaign targeting drink driving successfully reduced normative misperceptions, increased use of designated drivers and decreased drinking and driving among young people in the implementation area (Perkins, Linkenbach, Lewis, & Neighbors, 2010). However, a recent systematic review and meta-analysis of the evidence to date did not support the findings by Elder et al. (Yadav & Kobayashi, 2015). The authors concluded that there was no overall robust evidence that drink driving mass media campaigns significantly reduced the risk of alcohol-related road traffic accidents, even though some individual studies reported significant risk reductions. It is possible that a campaign's effectiveness is dependent on the specific message that was used, as the studies all evaluated different, existing mass media campaigns. No research has been conducted on the effect of drink driving mass media campaigns in the UK, so it is unclear whether findings would generalize to the UK.

1.4.2.2 Responsible drinking campaigns

There have been few evaluations of public health campaigns that aim to reduce population-level alcohol consumption. A mass-media campaign that ran in New Zealand between 1982-1985 increased public awareness of campaign commercials that were included, and exposure to the campaign was associated with a significant, but small decrease in positive alcohol-related attitudes (Casswell, Ransom, & Gilmore, 1990). Drinking intentions or alcohol consumption were not included as outcome measures, so it is unclear how the mass-media campaign affected these behavioural variables. A prospective cohort study demonstrated that the number of televised responsible drinking campaigns that adolescents were able to recall at age 13 and age 15 was not predictive of their alcohol consumption at age 18, whereas recall of alcohol promoting advertisements was associated with increased alcohol consumption (Connolly, Casswell, Zhang, & Silva, 1994). Evaluations of a more recent Australian mass media campaign that informed women of the link between alcohol consumption and breast

cancer showed that the campaign increased women's awareness of the campaign's message and increased motivation to reduce drinking among heavy drinking women (those who consume more than 2 Australian standard drinks per day), but did not affect actual drinking behaviour at follow-up (Dixon et al., 2015).

Some experimental studies looked at the immediate effects of UK public health campaigns (versus control conditions) on intentions to drink and actual drinking behaviour. In an online survey, participants were exposed to six televised responsible drinking campaigns, including some that have been aired in the UK, followed by a measure of urge to drink (Stautz & Marteau, 2016). Results showed that participants who had seen responsible drinking commercials had significantly lower urge to drink than those who had seen alcohol promoting adverts or neutral adverts. However, the researchers did not attempt to obscure the aims of the study and did not report the extent to which participants were aware of the study aims. Research has shown that participant awareness of the study aims and/or hypotheses might prompt them to respond in line with the hypotheses (Nichols & Edlund, 2015), which might have affected the results from Stautz and Marteau (2016). Similarly, a laboratory study investigated the effect of exposure to a UK anti-binge drinking campaign ("Know your limits") on Dutch students' intentions to refrain from binge drinking (Hendriks, De Bruijn, & Van Den Putte, 2012). They invited pairs of students (who were classmates) to the lab and asked them to discuss alcohol and binge drinking, after viewing the health campaign (versus a control group who did not view any alcohol-related messages). Results demonstrated that exposure to the campaign indirectly reduced binge drinking intentions: Participants who viewed the campaign reported that they spoke more negatively about binge drinking than participants in the control group, and students who reported a more negative conversation about binge drinking had greater intention to refrain from binge drinking. However, the authors do not report whether exposure to the campaign also had a direct effect on binge drinking intentions. Contrasting to the effect

demonstrated in these two previous studies, a laboratory study found an increase in immediate alcohol consumption after exposure to a responsible drinking commercial. Moss et al. (2015) exposed participants to posters from the Drinkaware campaign “Why let the good times go bad?” and measured subsequent alcohol consumption using a bogus taste test. Across multiple studies, they demonstrated that participants who were exposed to the Drinkaware posters consumed more alcohol during the taste test than participants in control conditions (non-alcohol posters and general public health posters).

The studies discussed in this section suggest that people may intend to reduce their alcohol consumption after viewing public health campaigns, but that this does not consistently translate to an actual reduction in immediate alcohol consumption. However, overall there has been little research into the effectiveness of responsible drinking campaigns, so conclusions should be treated with caution.

1.4.3 Evidence from tobacco warning labels/public health campaigns

Looking at the evidence discussed in the previous sections, one might conclude that warning labels and public health campaigns have no potential as tools to promote behaviour change. However, evidence from the tobacco literature shows that warning labels and public health campaigns have prompted marked reductions in smoking behaviour. A systematic review showed that warning labels on tobacco packaging promoted smoking cessation and discouraged youth smoking uptake, but label design moderated the extent of their effectiveness (Hammond, 2011): large pictorial warnings on cigarette packaging (which are increasingly common) were more effective than small text-only labels. Another systematic review concluded that tobacco public health campaigns can promote smoking cessation and reduce smoking prevalence if they are implemented in a context of comprehensive tobacco control programs (Durkin, Brennan, & Wakefield, 2012). They also argue that effectiveness depends

on the design: Messages that communicate negative health effects of tobacco with graphic imagery and/or personal testimonies perform better than messages without those features. Based on these positive findings, researchers have argued that alcohol warning labels and public health campaigns would be more successful if they followed the lessons learned from the tobacco literature (Al-hamdani, 2014; Claire Wilkinson & Room, 2009).

1.4.4 Warning labels/campaigns designed by industry sponsored NGOs

UK warning labels on alcohol packaging and in alcohol advertising refer alcohol consumers to the website www.drinkaware.co.uk – a website created by the NGO Drinkaware. Drinkaware is funded by voluntary donations from the UK alcohol industry (e.g., alcohol producers, retailers, pub operations, and restaurants; Drinkaware, n.d.). In addition to being featured on alcohol packaging and in marketing, Drinkaware also produces public health campaigns. However, there are concerns that the potential conflicts of interests could undermine the effectiveness of these warning labels and health campaigns (House of Commons Health Committee, 2012; McCambridge, Kypri, Miller, Hawkins, & Hastings, 2014). Recent findings from Australia support these concerns. Similar to UK warning labels, Australian labels on alcohol packaging are voluntary and refer to the website of an industry-sponsored NGO (DrinkWise in Australia). In a national survey, researchers measured awareness (free recall and recognition) of four aspects of the warning labels: The DrinkWise logo (“Get the facts – Drinkwise.org.au”), the pregnancy logo (crossed out picture of a pregnant woman with a glass of wine), an alcohol-harms question (“Is your drinking harming yourself or others?”), and an underage drinking warning (“Kids and alcohol don’t mix”) (Coomber, Martino, Barbour, Mayshak, & Miller, 2015). Results demonstrated that the majority of the Australian public were unaware of these four aspects. The proportion of survey respondents that were able to recall the aspects freely ranged from 0% (DrinkWise logo) to 16.1% (pregnancy logo) and the

proportion of survey respondents that recognized these aspects ranged from 12.9% (underage drinking warning) to 34.3% (pregnancy warning). These findings are in stark contrast with the previously discussed findings from the US, which showed increased awareness of the warning message (designed by the US government) after label implementation (Stockley, 2001). Therefore, the industry's involvement in the Australian warning label design might account for the limited warning label awareness among Australian alcohol consumers.

Similarly, research on industry-sponsored adverts showed that participants evaluated alcohol brands more positively after seeing adverts for these brands that focussed on responsible drinking or responsible behaviour under the influence of alcohol (for example, Coors' "Not now" adverts that showed situations in which alcohol would not be appropriate, such as driving or jet-skiing; S. W. Smith, Atkin, & Roznowski, 2009). Industry involvement may also be problematic in situations where the public are not aware that the public health campaign is industry sponsored. For example, Petticrew et al. (2016) investigated to what extent Diageo was involved in the development of a current public health campaign to stop 'out of control drinking' in Ireland (which was funded by Diageo). Their findings showed that Diageo appeared to be involved in the framing of the problem of 'out of control drinking' and the solutions, which informed the content of the campaign. As a result, the campaign is focussed on underage drinking and alcohol-related antisocial behaviour instead of, for example, alcohol-related health problems. Another recent study investigated young adults' responses to a DrinkWise responsible drinking campaign in Australia called 'How to drink properly' in order to reverse engineer the strategic intent of the campaign (Pettigrew, Biagioni, et al., 2016). Results suggested that the DrinkWise campaign reinforced current drinking attitudes and norm perceptions among young adults, especially the idea that alcohol is a natural element of social situations. Additionally, participants rarely reported a perceived need to alter their own drinking behaviour. The findings of Petticrew et al., (2016) and Pettigrew, Biagioni, et al.

(2016) suggest that there might be conflicts of interest involved in industry-sponsored public health campaigns that could affect how effective these campaigns are.

1.4.5 Public support for alcohol policy

A systematic review of alcohol policies shows that information-based alcohol policies (such as public health campaigns, warning labels and education) are generally ineffective at reducing population-level alcohol consumption compared to policies that limit the availability of alcohol and/or limit alcohol marketing (Anderson, Chisholm, & Fuhr, 2009). For example, Bosque-Prous et al. (2014) showed that the extent of advertising restrictions was inversely related to hazardous drinking in European countries. Countries with a ban on alcohol advertising had lower levels of hazardous drinking than countries with voluntary restrictions on alcohol advertising or no restrictions at all. Considering that the responsibility deal pledges rely on information based strategies, researchers have argued that the responsibility deal pledges were unlikely to actually change drinking behaviour or reduce alcohol-related harms (Knai, Petticrew, Durand, Eastmure, & Mays, 2015).

Recently, minimum unit pricing (MUP; a policy measure that would limit the affordability of alcohol) has been proposed and (briefly) endorsed by the UK government (HM Government, 2012). MUP would introduce a mandatory minimum price for each unit of alcohol sold in the UK. For example, a minimum price of £0.50 per unit would ensure that a 2 Litre (l) bottle of 5% cider (10 UK units), which has a current retail price of £3.19 (£0.32 per unit; ASDA, 2016), would have cost at least £5.00 if this MUP was implemented. Several studies used mathematical models to evaluate the potential impact of MUP on alcohol consumption and alcohol-related harms in the general population and specific sub-populations. Findings showed that MUP would lead to a substantial reduction in alcohol consumption and alcohol-related harm, specifically among harmful drinkers, whereas it would lead to a very

small reduction (approximately 4 units per drinker per year) in moderate or light drinkers' consumption (Holmes et al., 2014; Meng et al., 2013; Purshouse, Meier, Brennan, Taylor, & Rafia, 2010). Evidence from British Columbia, Canada showed a significant reduction in alcohol consumption across all beverage types after increases in the minimum price of different beverage types in the region (Stockwell, Auld, Zhao, & Martin, 2012). This is supported by findings from Finland that showed that systematic decreases in the price of alcohol were associated with increased prevalence of alcohol-related harm, especially among people with lower socio-economic status (SES) that are at increased risk of harm (Mäkelä, Herttua, & Martikainen, 2014). Despite the evidence that suggests that MUP might be an effective strategy for reducing alcohol-related harm, the English government decided not to implement MUP (or similar price reduction strategies; Gilmore & Daube, 2014), partially due to pressures from the alcohol industry (McCambridge, Hawkins, & Holden, 2014; Nicholls & Greenaway, 2015).

Public support for alcohol policies is a factor that may influence governments when deciding which policies to implement. Research on the public acceptability of policies shows that people were more accepting of non-intrusive policies (those that just provide information) than those that restricted or limited behaviour (Diepeveen, Ling, Suhrcke, Roland, & Marteau, 2013). For example, 82% of respondents in a survey about policy proposals in the United Kingdom supported drink labelling (a policy that has little evidence for its effectiveness in reducing alcohol consumption, discussed in section 1.4.1.1), compared to only 45% supporting MUP (Maryon-Davis & Jolley, 2010). Public acceptability is important for elected government officials, therefore it is likely that warning labels and public health campaigns will remain a common policy measure, despite their limited effectiveness.

1.5 Models of health behaviour

In order to implement effective warning labels and public health campaigns, it is

important to understand how they might reduce alcohol consumption. Similarly, in order to implement effective advertising restrictions, one needs to understand how alcohol advertisements increase alcohol consumption. In this section, I will discuss two psychological models of behaviour that have been applied to explain drinking behaviour, and I will examine how existing literature on the effects of warning labels, public health campaigns and alcohol marketing fits into these explanatory models.

1.5.1 Theory of planned behaviour

The theory of planned behaviour (TPB; Ajzen, 1985) is used to explain the influence of attitudes, subjective social norms (whether others would approve or disapprove of certain behaviours), behavioural control, and behavioural intentions on behaviour, and it has been applied to understanding determinants of alcohol consumption. According to the theory, behaviour is determined by intentions to engage in the behaviour and intentions are determined by attitudes and subjective norms related to the behaviour. Perceived behavioural control directly determines both intentions and actual behaviour (see Figure 1.1 for a schematic representation). A meta-analysis provided evidence that the TPB was an overall good predictor of a range of self-reported behaviours and observed behaviour (but the latter to a lesser extent; Armitage & Conner, 2001).

Several studies have demonstrated that TPB is an appropriate model to explain variance in several aspects of alcohol consumption, such as drinking behaviour in students (Conner, Warren, Close, & Sparks, 1999; Huchting, Lac, & LaBrie, 2008), and binge drinking (Elliott & Ainsworth, 2012; Norman, Armitage, & Quigley, 2007). However, findings from other research contradicted the role of TPB in adolescent alcohol consumption. One study showed that among adolescents, binge drinking behaviour at baseline increased positive attitudes towards binge drinking at a six-month follow-up, but binge drinking behaviour at the six-month

follow-up was not predicted by attitudes at baseline, suggesting that adolescents adapt their attitudes to their behaviour and not the other way around (van der Zwaluw, Kleinjan, Lemmers, Spijkerman, & Engels, 2013). A recent systematic review and meta-analysis examining the utility of TPB for understanding drinking behaviour found moderate to large effect sizes for most of the TPB relationships (Cooke, Dahdah, Norman, & French, 2016). In this meta-analysis, the authors distinguished between ‘pure’ perceived control over behaviour (measured with items like “Whether or not I engage in binge drinking in the next week is under my control”), ‘pure’ self-efficacy (confidence in own ability to perform a certain behaviour; measured with items like “If I wanted to, I am confident that I could engage in binge drinking in the next week”), and perceived behavioural control that was measured with a mix of perceived control and self-efficacy items. Attitudes were the strongest predictor of intentions, followed by subjective norms, perceived behavioural control and self-efficacy (‘pure’ perceived control was not significantly associated with intentions). Drinking intentions were strongly associated with actual behaviour, while self-efficacy was moderately associated with behaviour. Perceived behavioural control and ‘pure’ perceived control were negatively associated with behaviour. Results from this meta-analysis suggest that alcohol-related persuasion attempts would be most likely to affect behaviour if they affected drinking intentions, attitudes, subjective norms, and/or self-efficacy.

Evidence suggests that alcohol-related persuasion attempts affect drinking intentions, attitudes, and subjective norms. For example, exposure to public health campaigns reduced alcohol consumers’ intentions to drink (Dixon et al., 2015), whereas exposure to alcohol advertising increased intentions to drink (Alhabash et al., 2016; Christie, Fisher, Kozup, & Smith, 2001). Research also demonstrated that more positive attitudes towards alcohol adverts (Fleming, Thorson, & Atkin, 2004) and more positive attitudes towards alcohol (Goodall & Slater, 2010) after exposure to alcohol advertising predicted intentions to drink and willingness

to engage in risky drinking behaviour, respectively. Finally, one study showed that an on-campus social norms intervention reduced students' alcohol consumption, but only among students whose perceived social norms had changed in line with the social norms communicated in the campaign (Mattern & Neighbors, 2004). The effect of alcohol-related persuasion on changes in self-efficacy has not been studied. However, inclusion of self-efficacy statements in alcohol-related public health messages was associated with higher risk perceptions and increased intentions to cut down on drinking (M. J. Lee, 2010). Additionally, exposure to an AIDS warning campaign (Agha, 2003) and a campaign promoting physical activity (Renger, Steinfelt, & Lazarus, 2002) were associated with increased self-efficacy. This suggests that alcohol-related persuasion attempts might also target alcohol consumers' self-efficacy, which could be another route to ultimately changing their behaviour.

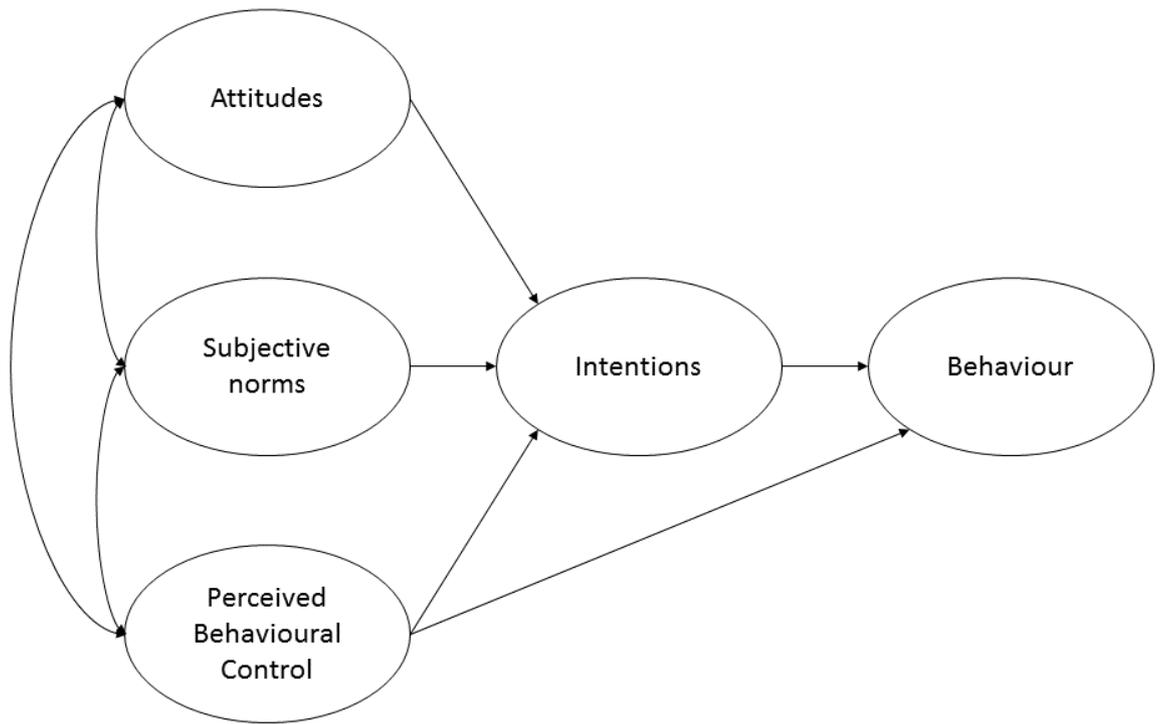


Figure 1.1. Schematic overview of causal relationships within the theory of planned behaviour (TPB), retrieved from Ajzen (1991, p. 182).

1.5.2 Dual process model of behaviour

Unlike TPB, which assumes deliberate action, dual process models assume that behaviour can also arise automatically and without much deliberation in response to certain cues in the environment. A well-known example of dual process models is the reflective-impulsive model of behaviour (Strack & Deutsch, 2004), which has been applied to consumer behaviour (Strack, Werth, & Deutsch, 2006) and addictive behaviours (Deutsch & Strack, 2006). In this model, behaviour is the outcome of two information processing systems that operate in parallel: A reflective system and an impulsive system. In the reflective system, behaviour is a consequence of a decision process, which leads to intentions to perform the behaviour and the behaviour itself (similar to TPB). In the impulsive system, behaviour is a consequence of behavioural associations that are automatically activated in response to perceptual input or reflective processes. The reflective system relies on motivation and has limited capacity, whereas the impulsive system requires little cognitive capacity. Therefore, reflective processing is more easily disrupted, making impulsive processing the “default”. Additionally, the impulsive system connects elements via (learned) associations, whereas the reflective system uses semantic rules to make connections.

A dual process model of addictive behaviours (Wiers et al., 2007; Wiers & Stacy, 2006) posits that the impulsive system becomes sensitized with repeated alcohol use, which leads to relatively automatic tendencies to approach alcohol as a response to alcohol stimuli (see Figure 1.2). This means that, in the absence of motivation to regulate drinking behaviour, alcohol cues (e.g., sight/smell of alcohol) activate pre-existing associations with alcohol (such as past behaviour, affective responses, implicit attitudes, or outcome expectancies), which results in motivation to drink alcohol if these associations are sufficiently favourable. This is associated with cognitive biases, such as selective attention towards alcohol cues (attentional bias; Field & Cox, 2008) and a tendency to approach alcohol (approach bias; Field, Kiernan, Eastwood,

& Child, 2008). The regulatory system can inhibit the impulsive system's approach response, but only if one is motivated and able to do so.

The support for dual-process models is mixed. Studies showed that measures of "impulsive system activation" (e.g., approach tendencies, implicit associations, and implicit attitudes) were associated with alcohol consumption in cross-sectional studies (current alcohol consumption; Houben & Wiers, 2007; Peeters et al., 2012) and predictive of future alcohol consumption in longitudinal studies (after controlling for self-report measures; Lindgren et al., 2016; Martin Braunstein, Kuerbis, Ochsner, & Morgenstern, 2016; Peeters et al., 2013). Additionally, meta-analyses concluded that implicit cognitions (e.g., attitudes, attention, semantic associations – measures related to the impulsive system) reliably predicted current substance use (Rooke, Hine, & Thorsteinsson, 2008) and explained unique variance in alcohol consumption when controlling for explicit measures (measures related to the reflective system; Reich, Below, & Goldman, 2010). However, recent findings suggested that researchers often fail to accurately estimate the influence of explicit measures (e.g., using only one measure to capture all explicit processes; Blanton, Burrows, & Jaccard, 2016). In their study, Blanton et al. (2016) measured the extent to which implicit measures of alcohol-related attitudes predicted future alcohol use after controlling for a range of explicit measures, such as explicit alcohol-related attitudes and norm perceptions. Implicit measures only explained an additional 2% of variance in future alcohol consumption after taking explicit measures into account. This suggests that implicit measures provide little more information than explicit measures. Other studies found that reflective, not impulsive processes were more important determinants of adolescents' future drinking behaviour (S. Pieters, Burk, Vorst, Engels, & Wiers, 2014). Additionally, across a range of health behaviours, explicit measures of behavioural motivation were better predictors of future behaviour than implicit measures (Keatley, Clarke, & Hagger, 2013). Thush et al. (2008) showed that implicit measures were more predictive of alcohol

consumption among adolescents with low working memory capacity, whereas explicit measures were more predictive among adolescents with high working memory capacity. This is in line with the dual-process prediction that the extent to which impulsive and reflective processes influence behaviour depends on an individual's ability to regulate their behaviour (with reflective processes becoming a more important determinant with increased ability to regulate). However, cognitive abilities did not consistently moderate the relation between explicit measures and alcohol consumption in a large scale longitudinal study (Littlefield, Vergés, McCarthy, & Sher, 2011). So, there is some evidence that automatic processes could affect drinking behaviour, but implicit measures of alcohol-related cognitions are not consistently better predictors of behaviour than self-report measures.

These findings suggest that, in addition to avenues for persuasion discussed in section 1.5.1 (which would also apply to the reflective system), alcohol-related persuasion attempts might influence behaviour by affecting automatic associations with alcohol. Indeed, a recent study showed that participants had significantly more positive implicit attitudes towards alcohol after exposure to alcohol advertising and alcohol-related public health campaigns, but explicit attitudes were not affected (K. G. Brown, Stautz, Hollands, Winpenny, & Marteau, 2015). Dual-process models also provide explanations for unexpected effects of alcohol-related persuasion attempt, such as increased alcohol consumption shortly after exposure to responsible drinking commercials (Moss et al., 2015). As mentioned before, only the reflective system uses semantic processing, which has implications for impulsive processing of negations. The model suggests that automatic processing of a negation (e.g., “no drinking”) results in the same behaviour as automatic processing of the non-negated phrase (e.g., “drinking”). Experimental research supports this: Smokers had strong approach tendencies towards tobacco after viewing photographs with “no smoking” signs in the background than after viewing the same photographs without the “no smoking” signs (Earp, Dill, Harris,

Ackerman, & Bargh, 2013). Similarly, participants who viewed anti-tobacco advertisements were more likely to smoke during a break from the experiment than those who viewed control advertisements (Harris, Pierce, & Bargh, 2013). These findings suggest that automatic processing of alcohol warning labels and public health campaigns may lead to increased alcohol consumption, possibly because the impulsive system is unable to distinguish them from conventional alcohol cues such as those used in advertising.

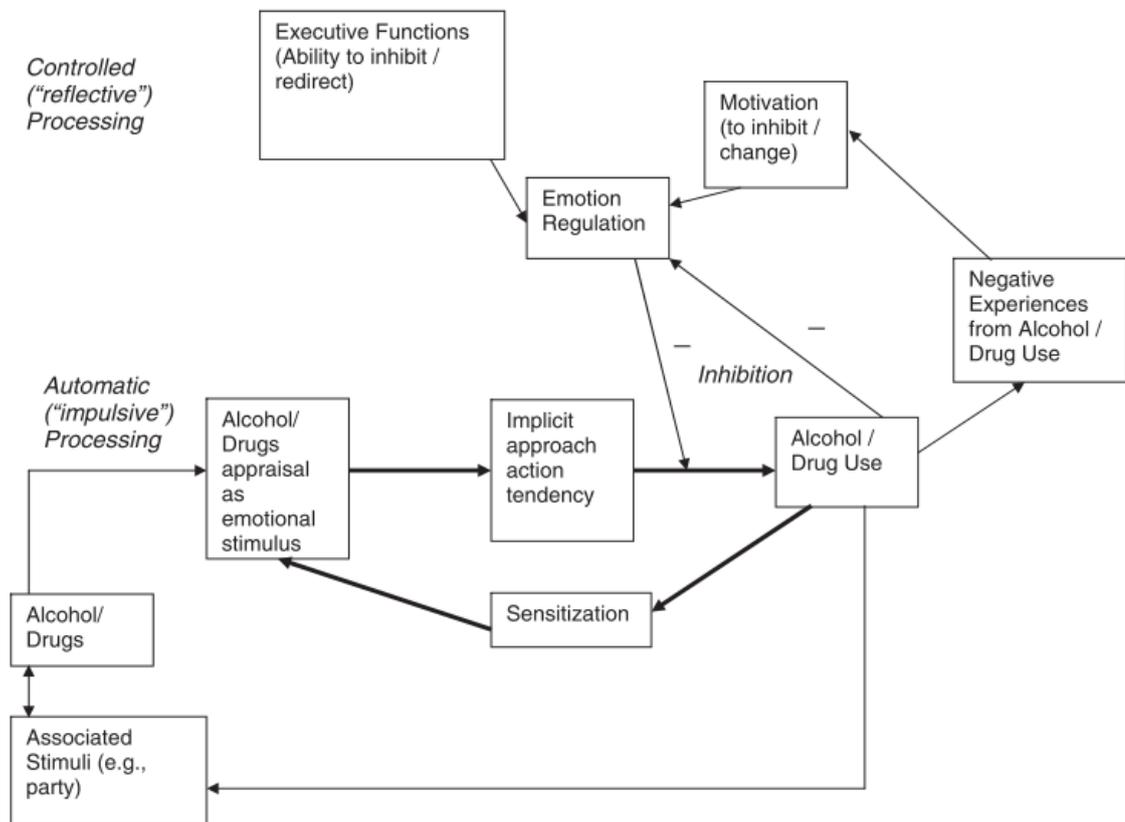


Figure 1.2. A schematic representation of the reflective-impulsive model of addictive behaviour, retrieved from Wiers and Stacy (2006, p. 293).

1.6 Models of Persuasion

The models discussed in the previous section suggested possible avenues for behaviour change by targeting attitudes, perceived social norms, or automatic responses to alcohol, but they do not explain how and under what circumstances warning labels, public health campaigns and alcohol advertising might change alcohol-related attitudes and social norm perceptions. In this section, I will discuss two theories that give insight into how exposure to a persuasive message might result in attitude and behaviour change.

1.6.1 Elaboration likelihood model

The elaboration likelihood model of persuasion (ELM; Petty & Cacioppo, 1986) suggests that there are two routes from argument to attitude change: The central route and the peripheral route. The ELM is a dual-process theory of attitude change, relying on similar premises as dual-process theories of behaviour: There is a relatively automatic route to persuasion (the peripheral route) and a deliberate route (the central route), which relies on motivation and ability to process the persuasive argument (see Figure 1.3 for a schematic representation of the ELM). Attitude change through the central route is due to thoughtful and deliberate elaboration of any given argument, whereas attitude change through the peripheral route is due to heuristic processing (i.e., using cognitive “short-cuts”, such as using a rule of thumb or stereotyping) of cues in the persuasion context without thoughtful elaboration of the information presented. According to this model, attitude change through the central route is robust and predictive of future behaviour, whereas attitude change through the peripheral route is temporary and generally a poor predictor of behaviour.

According to this model there are three ways that alcohol-related persuasion might change attitudes (and subsequently behaviour): Using a persuasive argument, using a favourable peripheral cue, or by affecting the extent that someone is motivated and able to

elaborate (i.e., think about the merits of the argument). I will use public health campaigns as a hypothetical example to illustrate the predictions based on the ELM. Many public health campaigns use factual information (e.g., “alcohol consumption increases your risk of breast cancer”) as an argument to persuade alcohol consumers to reduce their drinking. Someone who is motivated to think about the merit of this argument might change their attitudes towards alcohol consumption if they subsequently generate sufficient positive cognitions about cutting down and/or sufficient negative cognitions about alcohol consumption (central route). For someone who is not motivated to process the argument, merely presenting the information would not be enough to elicit attitude change. However, if the information is presented by an expert or a well-liked celebrity, for example, these peripheral cues may a) increase motivation to elaborate on the message and increase central processing, or b) cause a temporary attitude change in line with the peripheral cues that does not lead to increased motivation to process. As elaboration increases, the persuasive argument (e.g., argument strength) becomes a more important determinant of persuasion than peripheral cues. However, both routes of processing can occur at the same time and peripheral cues can facilitate or hinder persuasion during central processing. For example, someone who is already motivated to elaborate on factual information presented in a public health campaign, may become more motivated if the information is delivered by an expert. On the other hand, if the information is accompanied by shocking or threatening images, this might decrease their motivation to elaborate on the message.

There are many factors that affect elaboration likelihood. People are more likely to elaborate if the issue at hand is personally relevant (see for example; Ajzen, Brown, & Rosenthal, 1996) or if the message is delivered by an untrustworthy source (Priester & Petty, 1995). Additionally, elaboration is more likely if people have the ability to elaborate. For example, if the message is shown/spoken too fast or the recipient is distracted, the recipient has limited opportunity to elaborate, even if they are motivated to. A final important note is that

persuasion is not guaranteed, even if elaboration is high. For instance, if an argument is weak, the central route would lead to predominantly unfavourable thoughts about the advocated position. Negative persuasion (also referred to as a boomerang effect or reactance) occurs when the thoughts are more unfavourable than before exposure to the message. This will be expanded on in section 1.6.2.

Research supports the ELM predictions that peripheral cues are more likely to influence attitudes under low elaboration (compared to high elaboration) and that argument strength is more likely to influence attitudes under high elaboration (compared to low). For example, experimental studies showed that message framing (Putrevu, 2014), descriptive norm messages (Kredentser, Fabrigar, Smith, & Fulton, 2012), scarcity information (Grant, Fabrigar, Forzley, & Kredentser, 2014) were more predictive of attitudes and behavioural intention under low elaboration than high elaboration conditions. A meta-analysis showed that high quality arguments were more persuasive than low quality arguments under high elaboration conditions, compared to low elaboration (Carpenter, 2015). However, the effect size was considerably smaller in studies that measured a change in attitude, compared to studies that only measured attitude strength after exposure to the argument. This suggests that the overall effect size might be overestimated. ELM also predicted that central processing leads to stronger and more robust attitude change than peripheral processing. However, recent research indicated that strong attitudes can also be formed under low elaboration conditions (Kwon & Nayakankuppam, 2015). Elaboration facilitates, but is not necessary for the formation of strong attitudes. Additionally, a recent theoretical perspective suggested that the effect of elaboration on argument strength might depend on to what extent people believe they elaborated on the issue and to what extent they believe greater elaboration produces better decisions (Barden & Tormala, 2014).

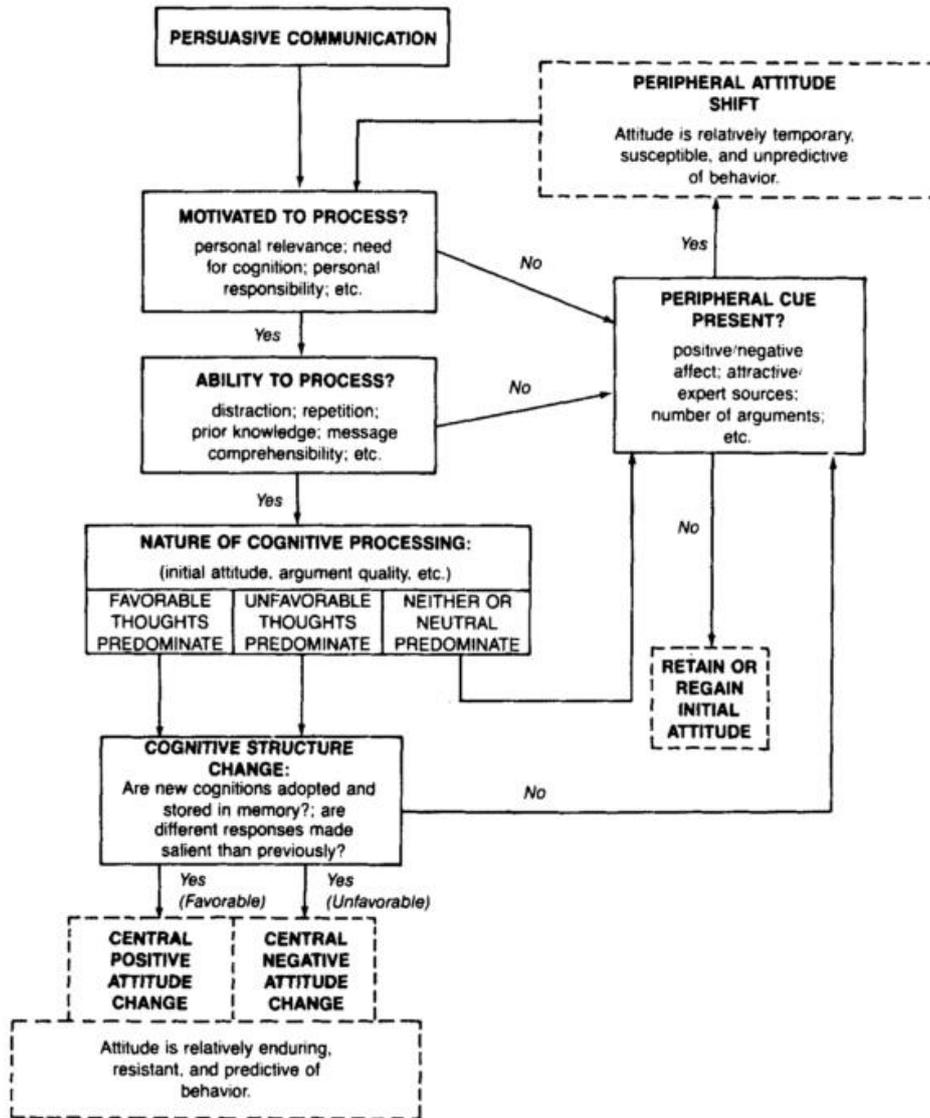


Figure 1.3. Schematic representation of the elaboration likelihood model (ELM), retrieved from Petty and Cacioppo (1986, p. 126).

1.6.2 Reactance

Reactance occurs in response to a perceived threat to freedom and is defined as the motivation to restore this freedom. This can be done directly, by doing the “forbidden” act, or indirectly, for example by favouring the threatened behaviour more (Pavey & Sparks, 2009). Generally, reactance is considered to be a conscious response to persuasion attempts, however results from an experimental study demonstrated that reactance can be elicited outside of someone’s awareness (Wellman & Geers, 2009). Some researchers have provided evidence for reactance in response to alcohol-related persuasion. Bensley and Wu (1991) demonstrated that participants consumed more alcohol in response to a threatening public health campaign than a non-threatening public health campaign. Another study showed that college students of legal drinking age drank less than underage college students (but they did not differ on illicit substance use), which could be interpreted as reactance in response to the age limit (Allen, Sprenkel, & Vitale, 1994). More recent studies have shown increased alcohol consumption (Moss et al., 2015) and less negative attitudes (K. G. Brown et al., 2015) shortly after exposure to alcohol public health campaigns. Additionally, Harris et al. (2013) demonstrated that smokers were more likely to smoke after seeing anti-tobacco adverts than after seeing control advertisements. However, participants in the latter study did not report being aware of the advertisements’ effect on their behaviour, which suggests that these results might not be driven by conscious reactance.

Social psychologists have developed tactics for reducing reactance that could be adopted in public health messages. For example, using concrete, non-controlling language reduced reactance while still generating a change in behaviour (C. H. Miller, Lane, Deatrck, Young, & Potts, 2007). However, a recent large scale study across four countries suggested that reactance to tobacco warning labels did not interfere with cessation attempts (Cho et al., 2016). Smokers with strong reactance to warning labels reported greater likelihood of avoiding

the label, but also greater likelihood of forgoing cigarettes due to warnings. This suggests that reactance to alcohol warning labels and public health campaigns might not necessarily limit changes in alcohol consumption.

1.7 The importance of visual attention

Visual attention is predictive of consumer behaviour: People are more likely to choose a products/brands they attended to in a forced choice paradigm (R. Pieters & Warlop, 1999; Schonberg et al., 2014). This is a bidirectional relation. People pay more attention to products they prefer over other products (di Pellegrino, Magarelli, & Mengarelli, 2011), and product choice can be influenced by experimentally manipulating the amount of attention people pay to a product (Armel, Beaumel, & Rangel, 2008). So, attention both reflects and influences preferences. Evidence from the appetite literature shows that people who have been instructed to select healthier food choices paid more attention to nutrition labels (Bialkova & van Trijp, 2011; Turner, Skubisz, Pandya, Silverman, & Austin, 2014; Visschers, Hess, & Siegrist, 2010). In another study, Bialkova et al. (2014) showed that increased attention to the nutrition label increased subsequent choice of the product containing that label in a forced choice paradigm. Visual attention to food marketing also predicts behaviour: Children who paid more attention to food cues in a snack food *advergame* ate more in a subsequent snack food taste test (Folkvord, Anschutz, Wiers, & Buijzen, 2014).

Selective attention towards alcohol cues has been researched extensively as a predictor of alcohol consumption. Increased attention to alcohol cues compared to neutral cues (alcohol attentional bias) is considered to be an automatic response to alcohol stimuli under the dual process model. In a recent theoretical model, Field et al. (2016) argue that attentional biases fluctuate in line with the underlying motivational state, and the bias exerts a causal influence on proximal, but not distal, drinking behaviour. For example, Field and Eastwood (2005)

manipulated heavy drinkers' attentional bias towards or away from alcohol and measured subsequent alcohol consumption. They show that the participants whose attentional bias had been manipulated to pay more attention to alcohol cues drank more alcohol than the participants who had been trained to avoid looking at alcohol cues.

Eye-tracking research investigating tobacco-related persuasion attempts suggests that visual attention might be important to determine the effectiveness of persuasion attempts. For example, individual differences in attention to tobacco warning labels predicted message recall (Peterson, Thomsen, Lindsay, & John, 2010; Strasser, Tang, Romer, Jepsen, & Cappella, 2012) and perceptions of tobacco-related risk, but not intentions to quit smoking (Süssenbach, Niemeier, & Glock, 2013). Additionally, individual differences in visual attention to warnings embedded in tobacco adverts were predictive of message recall (Krugman, Fox, Fletcher, Fischer, & Rojas, 1994). One study looked at smoking cues within televised anti-tobacco adverts and found that "active" smoking cues (someone smoking) attracted more attention than "passive" smoking cues (someone holding a cigarette; Sanders-Jackson et al., 2011). This might account for findings by S. Lee and Cappella (2013), who showed that the inclusion of smoking cues in anti-tobacco adverts caused poorer message recall, compared to anti-tobacco adverts that did not include smoking cues. Finally, two studies investigated how individual differences in smoking habits might predict attention to warning labels (Maynard, Munafò, & Leonards, 2013; Munafò, Roberts, Bauld, & Leonards, 2011). They showed that adult non-smokers and weekly-smokers, and adolescent weekly-smokers paid more attention to warning labels on plain packaging from which all the brand imagery had been removed compared to warning labels on standard branded packs. These findings are to be expected, as the warning label becomes the most visually interesting aspect of the cigarette packaging with the removal of brand imagery. However, attention allocation to the warning labels among adult and adolescent daily smokers did not depend on the type of packaging. Daily smokers paid more

attention to brand information than warning labels, even on packaging on which all brand imagery had been replaced by the brand name in a standard type face on a white background. This suggests that they avoid looking at warning labels. In a follow-up study, Maynard et al. (2014) demonstrated that warning labels on plain packaging captured dependent smokers' initial attention. However, after approximately 2 seconds, smokers shifted their attention away from the warning label to the brand information for the remainder of the viewing time (a total of 10 seconds). This supports the hypothesis that smokers may actively avoid looking at warning labels.

Findings with regard to visual attention to alcohol-related persuasion attempts mirror the tobacco findings. Visual attention to warning labels embedded in alcohol advertising was associated with increased message recall (Thomsen & Fulton, 2007). Another study showed that individual differences in attention to textual information about alcohol-related harms was associated with intentions to reduce drinking (S. L. Brown & Richardson, 2012). These studies also showed that the responsible drinking information was attended to more if it was embedded in product adverts that were focussed on responsible drinking (compared to traditional alcohol promoting adverts) and if it was not accompanied by distressing pictures. A final study exposed participants either to responsible drinking posters (from a Drinkaware campaign) or posters from a general public health campaign (Change4Life), whilst measuring their eye-movements (Moss et al., 2015). Results showed that participants in the Change4Life condition paid more attention to the textual information on the posters than participants in the Drinkaware condition. They also found that participants in the Drinkaware condition drank more alcohol than participants in the Change4Life condition in a subsequent taste-test. The authors suggested that group differences in attention allocation accounted for group differences in alcohol consumption, but they did not test this formally.

To conclude, there is some evidence that visual attention to responsible drinking cues

and alcohol cues in warning labels, public health campaigns and alcohol advertising might play a role in their persuasive effect. However, limited research has been conducted into visual attention to alcohol-related persuasion and there are some gaps in the literature. It is unclear how much attention alcohol consumers allocate to alcohol cues and responsible drinking messages on alcohol packaging, in public health campaigns and in alcohol advertising, or whether attention is affected by goals or consumption habits. Additionally, it is unclear whether individual differences in attention to alcohol cues and responsible drinking cues in alcohol-related persuasion attempts are predictive of subsequent drinking intentions and alcohol consumption.

1.8 Aims of the thesis

To summarize, the UK public and university students in particular consume alcohol in a hazardous manner, which puts them and people around them at increased risk of alcohol-related harm. The fact that alcohol is heavily marketed across the UK potentially contributes to these hazardous drinking patterns. Alcohol marketing has been shown to increase alcohol consumption in the long term and the short term. However, most research on alcohol marketing has been conducted with adolescents and the evidence on short-term effects of alcohol marketing on adult drinking behaviour is limited.

In an attempt to curb harmful alcohol use in the UK, governments and industry use warning labels and public health campaigns to inform the public of alcohol-related harm and reduce hazardous drinking. The available evidence suggests that warning labels and public health campaigns increase message awareness, but otherwise have little effect on risk perceptions and actual drinking behaviour. One study showed that an alcohol public health campaign actually increased immediate alcohol consumption in the lab and this may have been due to limited visual attention to responsible drinking statements in the campaign. Evidence from the tobacco and food literature demonstrated that visual attention to warning labels and

advertisements predicted product choice, behavioural intentions and behaviour. This suggests that attention to alcohol warning labels, public health campaigns and advertising might predict the extent to which they influence drinking intentions and behaviour.

In this thesis, I test the general hypothesis that individual differences in visual attention to alcohol cues and responsible drinking statements underlie the effect of alcohol-related mass persuasion attempts (i.e., alcohol advertisements, warning labels and public health campaigns) on the antecedents of drinking behaviour, and on actual drinking behaviour. A secondary aim of this thesis was to examine the effect of current and novel UK warning labels, public health campaigns and alcohol advertisements on drinking intentions and immediate alcohol consumption (see Table 1.1 for an overview of all the included studies). These questions are important for two reasons. Firstly, this research will advance our understanding of the role of visual attention in alcohol persuasion. Secondly, descriptive data of attention to warning labels and alcohol cues may inform future policy on designing new warning labels and public health campaigns, and on potential restrictions on alcohol marketing.

In the first studies (Chapter Two), I focused on visual attention to current UK warning labels and branding on alcohol packaging and how this is related to individual differences in drinking habits and motivation to reduce drinking. This was investigated cross-sectionally (Study 2.1) and experimentally (Study 2.2). Study 2.2 also examined the effect of increasing attention to warning labels on drinking intentions. Findings suggested that the current UK warning labels did not attract substantial attention, and the amount of attention that participants directed to them did not affect their drinking intentions.

Therefore, I conducted three studies (Chapter Three) to contrast the effects of warning labels on alcohol packaging that are currently in use in the UK with some novel label designs on drinking intentions (Study 3.1) and willingness to pay for alcohol (Studies 3.2 and 3.3). This was investigated using two between-subjects experiments conducted online (Studies 3.1 and

3.2) and one within-subjects experiment conducted in the laboratory (Study 3.3). In Study 3.3, I also measured visual attention to the warning labels, to investigate whether visual attention to warning labels was associated with willingness to pay for alcohol products. Findings showed that novel warning labels did not attract more attention than existing warning labels, nor did they significantly influence willingness to pay for alcohol.

In the remainder of the thesis I investigated the role of attention in responses to advertising and public health campaigns. In Chapter Four I conducted a between-subjects experiment in a semi-naturalistic environment to investigate whether alcohol advertising affected proximal alcohol consumption in a brand-specific or general manner, and I also investigated how peer influence effects might interact with or mask the effects of alcohol advertising on drinking behaviour. Results suggested that alcohol advertising did not affect drinking behaviour, however methodological limitations mean that these findings should be interpreted with caution.

Chapter Five describes two studies in which I examined visual attention to responsible drinking statements and alcohol cues in UK public health campaigns and alcohol advertising. In Study 5.1, I investigated attention to responsible drinking statements in public health campaigns and their effect on drinking intentions using a between-subjects design. In Study 5.2, I investigated how attention to responsible drinking statements and alcohol cues in alcohol advertising predicted alcohol consumption in the laboratory using a cross-sectional design. Findings showed that attention to responsible drinking statements did not predict drinking intentions or immediate alcohol consumption, but visual attention to alcohol portrayal (an actor sipping alcohol) in alcohol advertising predicted increased alcohol consumption in the laboratory.

Finally, in Chapter Six, I used focus groups to investigate subjective responses to current UK warning labels and public health campaigns and aimed to gather participants'

recommendations for novel warning labels/responsible drinking statements that they considered to be more persuasive. Findings showed that participants did not consider warning labels/commercials to be personally relevant and that they mistrusted the message source. Instead, participants suggested that warning messages focussing on alcohol-related harm (to themselves or others) might be more persuasive.

Overall, the findings reported in this thesis demonstrate that responsible drinking statements/labels attract limited attention and that increased attention to these labels does not prompt alcohol consumers to intend to reduce their drinking. I found no evidence that alcohol-related persuasion affected immediate alcohol consumption or drinking intentions, but attentional processing of alcohol portrayal in alcohol advertising was associated with increased alcohol consumption in the laboratory. My findings also suggest that responsible drinking statements could attract more attention if their content and format were improved.

Table 1.1. Reference table outlining all of the studies in this thesis, and their primary hypotheses, methods, outcomes measured and primary findings.

Study	Primary hypothesis	Methods	Outcome(s)	Findings
2.1	<p>H1: Warning labels attract less attention than branding.</p> <p>H2: Motivation to reduce drinking is associated with greater attention to warning labels.</p>	<p>Cross-sectional laboratory study that used eye-tracking to measure visual attention to branding and warning labels on alcohol and soda containers.</p>	<p>Visual attention to warning labels on alcohol packaging</p>	<p>H1: Participants attended more to branding than warning labels on alcohol packaging.</p> <p>H2: Motivation to reduce drinking was associated with reduced attention to warning labels.</p>
2.2	<p>H1: Motivation to reduce drinking increases attention to warning labels.</p> <p>H2: Attention to warning labels (vs branding) reduces intentions to drink in the next week.</p>	<p>Between-subjects laboratory study in which motivation to reduce drinking was manipulated using a brief intervention (vs control) before measuring attention to branding and warning labels. Then attention was manipulated toward warning labels (vs branding) before measuring participants' drinking intentions for the subsequent week.</p>	<p>Visual attention to warning labels on alcohol packaging, drinking intentions</p>	<p>H1: Motivation to reduce drinking did not influence attention to warning labels on alcohol packaging.</p> <p>H2: Attention to warning labels did not affect drinking intentions.</p>

Table 1.1. Continued

Study	Primary hypothesis	Methods	Outcome(s)	Findings
3.1	Exposure to novel health warnings reduces intentions to drink in the subsequent week compared to unit information labels and a control label	Between-subjects online study in which participants were asked to indicate their intentions to drink in the next week after exposure to one of seven different warning labels (4 novel health warnings, 2 unit information labels, 1 control label).	Drinking intentions	Exposure to novel health warnings did not affect drinking intentions.
3.2	Novel health warnings on alcohol packaging reduce how much money people are willing to pay for the product	Between-subjects online study in which participants were asked to indicate how much they were willing to pay for alcohol products that contained one of four labels (1 novel health warning, 2 unit information labels, 1 control label).	Willingness to pay	Novel health warnings on alcohol products did not reduce willingness to pay for alcohol

Table 1.1. Continued

Study	Primary hypothesis	Methods	Outcome(s)	Findings
3.3	<p>H1: Novel health warnings on alcohol packaging reduce how much money people are willing to pay for the product.</p> <p>H2: Novel health warnings attract more attention than unit information labels and a control label.</p> <p>H3: Individual differences in attention to warning labels moderate effect in H1.</p>	<p>Within-subjects laboratory study in which participants were asked to indicate how much they were willing to pay for alcohol products that contained one of four labels (1 novel health warning, 2 unit information labels, 1 control label), whilst their attention to the warning labels was measured using eye-tracking.</p>	<p>Willingness to pay, attention to warning labels</p>	<p>H1: Novel health warnings on alcohol products did not reduce willingness to pay for alcohol.</p> <p>H2: Novel health warnings did not attract more attention than unit information labels or control labels.</p> <p>H3: Attention to warning labels was not associated with willingness to pay for the product.</p>

Table 1.1. Continued

Study	Primary hypothesis	Methods	Outcome(s)	Findings
4	Exposure to alcohol advertisements increases immediate alcohol consumption, especially of the advertised brand	Between-subjects laboratory study in which participants were asked to watch a television programme, which was interrupted by 4 advert breaks containing one of four target ads each (one of two alcohol brands, one soft drink brand, or one control brand) among two neutral ads. Whilst watching TV, participants had the opportunity to consume some alcoholic or non-alcoholic drinks. We recorded the type of drink participants consumed and at what time they sipped from their drink in relation to the advert break.	Immediate alcohol consumption (drink choice, sipping behaviour in relation to advert exposure)	Study limitations meant that results were inconclusive

Table 1.1. Continued

Study	Primary hypothesis	Methods	Outcome(s)	Findings
5.1	<p>H1: Responsible drinking statements attract more attention in public health campaigns than in alcohol advertising.</p> <p>H2: Exposure to a public health campaign reduces intentions to drink in the next week compared to exposure to an alcohol advert that emphasized responsible drinking and a conventional advert.</p> <p>H3: Individual differences in attention to alcohol cues and responsible drinking statements moderate effect in H2.</p>	<p>Between-subjects laboratory study in which participants viewed one of three TV alcohol-related adverts (conventional advert; product advert that emphasized responsible drinking; or public health campaign) whilst their visual attention to alcohol cues and responsible drinking statements was recorded, before reporting their drinking intentions.</p>	<p>Visual attention to alcohol cues and responsible drinking statements, drinking intentions</p>	<p>H1: Responsible drinking statements attracted more attention in the public health campaign than in the alcohol advert that emphasized responsible drinking.</p> <p>H2: Drinking intentions did not differ between participants exposed to the conventional advert, advert that emphasized responsible drinking or the public health campaign.</p> <p>H3: Attention allocation was not associated with drinking intentions.</p>

Table 1.1. Continued

Study	Primary hypothesis	Methods	Outcome(s)	Findings
5.2	<p>H1: Responsible drinking statements in alcohol adverts attract less attention than alcohol cues.</p> <p>H2: Attention to responsible drinking statements is associated with less alcohol consumption in the lab.</p> <p>H3: Attention to alcohol cues (particularly alcohol portrayal) is associated with greater alcohol consumption in the lab.</p>	<p>Cross-sectional study design in which participants viewed alcohol and soda advertisements whilst their attention to alcohol/soda cues and responsible drinking statements was recorded, before completing a bogus taste test with different alcoholic and non-alcoholic drinks.</p>	<p>Visual attention to alcohol cues and responsible drinking statements, immediate alcohol consumption</p>	<p>H1: Alcohol cues attracted more attention than responsible drinking statements.</p> <p>H2: Attention to responsible drinking statements was not associated with alcohol consumption in the lab.</p> <p>H3: Attention to alcohol portrayal (but not alcohol cues in general) was associated with greater alcohol consumption in the lab.</p>

Table 1.1. Continued

Study	Primary hypothesis	Methods	Outcome(s)	Findings
6	<p>Exploratory investigation of subjective evaluations of</p> <p>H1: current UK warning labels on alcohol packaging, public health campaigns and alcohol advertisements that focus on responsible drinking,</p> <p>H2: suggestions for alternative responsibility messages that would be more persuasive.</p>	<p>Focus group study in which participants opinions about current UK warning labels on alcohol packaging, public health campaigns and alcohol advertisements with a focus on responsible drinking were recorded, in addition to their suggestions for more persuasive responsible drinking messages.</p>	<p>Themes related to the research question.</p>	<p>H1: Participants did not think that current messages would influence their own or other people's drinking behaviour and reported that they did not find the messages credible (content and source).</p> <p>H2: Messages that communicate long-term health outcomes from drinking, messages that communicate general short-term adverse effects from alcohol consumption and messages that communicate harm to others might be more persuasive.</p>

Chapter 2

Alcohol consumers' attention to warning labels and brand information on alcohol packaging: Findings from cross-sectional and experimental studies

This chapter describes a cross-sectional study (study 2.1) and an experimental study (study 2.2) in which I examined visual attention to UK warning labels on alcohol packaging and how this might interact with individual differences in drinking habits and motivation to reduce drinking. Both studies demonstrated that warning labels capture minimal attention, but the amount of attention is roughly proportional to the size of the warning labels. Results from study 2.1 suggested that individual differences in motivation to reduce drinking reduced participants' attention to brand information on alcohol packaging. I investigated this hypothesis experimentally in study 2.2, in which participants received a brief intervention (versus a control intervention) before measuring visual attention to branding and warning labels on alcohol packaging. Then, participants' attention was manipulated towards warning labels (versus brand information), before measuring participants' intentions to drink in the subsequent week. Participants who received the brief intervention paid less attention to alcohol branding (but not more to warning labels). Visual attention to warning labels did not reduce how much alcohol participants intended to drink in the subsequent week. Overall, our findings suggest that current alcohol warning labels need to be improved in order to capture more attention and reduce alcohol consumption.

This chapter is based on Kersbergen, I. & Field, M., 2017. Alcohol consumers' attention to warning labels and brand information on alcohol packaging: Findings from cross-sectional and experimental studies. *BMC Public Health*, 17, 123. This chapter deviates at points from the

published manuscript in response to viva corrections.

Contributions: I designed the study, which was approved by Matt Field (primary supervisor).

I collected and analysed the data. Matt Field gave comments on the chapter.

2.1 Abstract

Alcohol warning labels have a limited effect on drinking behaviour, potentially because people devote minimal attention to them. We report findings from two studies in which we measured the extent to which alcohol consumers attend to warning labels on alcohol packaging, and aimed to identify if increased attention to warning labels is associated with motivation to change drinking behaviour. Study 2.1 (N = 60) was an exploratory cross-sectional study in which we used eye-tracking to measure visual attention to brand and health information on alcohol and soda containers. In study 2.2 (N = 120) we manipulated motivation to reduce drinking using an alcohol brief intervention (vs control intervention) and measured heavy drinkers' attention to branding and warning labels with the same eye-tracking paradigm as in study 2.1. Then, in a separate task we experimentally manipulated attention by drawing a brightly colored border around health (or brand) information before measuring participants' self-reported drinking intentions for the subsequent week. Study 2.1 showed that participants paid minimal attention to warning labels (7% of viewing time). Participants who were motivated to reduce drinking paid less attention to alcohol branding and alcohol warning labels. Results from study 2.2 showed that the alcohol brief intervention decreased attention to branding compared to the control condition, but it did not affect attention to warning labels. Furthermore, the experimental manipulation of attention to health or brand information did not influence drinking intentions for the subsequent week. Alcohol consumers allocate minimal attention to warning labels on alcohol packaging and even if their attention is directed to these warning labels, this has no impact on their drinking intentions. The lack of attention to warning labels, even among people who actively want to cut down, suggests that there is room for improvement in the content of health warnings on alcohol packaging.

2.2 Introduction

In March 2011, alcohol beverage companies in the UK pledged to put warning labels on 80% of alcoholic drink containers as part of the public health responsibility deal (Department of Health, 2011b). These labels contain 1) the alcohol content (UK units), 2) the daily guidelines for maximum alcohol consumption, 3) a pregnancy warning, 4) a link to drinkaware.co.uk, the website of an industry sponsored charity (optional), and 5) a responsibility statement (optional; Portman Group, 2011)³. Warning labels have a limited effect on drinking behaviour. Narrative reviews of the evidence on alcohol health warnings demonstrated that public awareness of the warning label typically increases after implementation, but this does not translate to increased alcohol-related risk perceptions or reduced alcohol consumption (Stockley, 2001; Stockwell, 2006; Celia Wilkinson et al., 2009). Similarly, a systematic review showed that information-based policies (such as warning labelling) are generally ineffective (Anderson, Chisholm, et al., 2009), and researchers have argued that the pledges included in the responsibility deal are therefore unlikely to affect behaviour (Knai et al., 2015).

It is possible that warning labels have a limited effect on drinking behaviour because people pay little attention to them. Indeed, participants spent on average 7% of total viewing time looking at warning messages in alcohol advertisements (Thomsen & Fulton, 2007). However, there are likely to be individual differences in the amount of attention paid to health warning information, which may be important. Tobacco and food literature shows that consumption habits (Maynard et al., 2013; Munafò et al., 2011) and goals (Bialkova & van Trijp, 2011) affect attention towards warning labels. In turn, attention to warning labels might

³ One might argue that these labels do not warn against any adverse outcomes and should therefore not be called warning labels. In previous literature, these types of “drink responsibly” labels have been referred to as “warning labels” or “health warnings” (Claire Wilkinson & Room, 2009). For the sake of consistency, we will refer to the [drinkaware](http://drinkaware.co.uk) labels as health warning labels in this manuscript.

also influence behaviour. For example, bar visitors drank less alcohol if their attention had been drawn to warning labels (Malouff, Schutte, Wiener, Brancazio, & Fish, 1993).

Similarly, nutrition labels had a stronger influence on product choice when they were attended to longer (Bialkova et al., 2014). This raises the possibility that if warning labels on alcohol packaging are sufficiently ‘attention grabbing’, their impact on alcohol consumption at the population level could be substantial.

Unfortunately, nothing is known about the extent to which alcohol consumers attend to warning labels, how much their attention is related to individual differences in drinking behaviour and motivation to change it, and whether beneficial behaviour change is a likely consequence of increasing attention to warning labels on packaging. The purpose of the studies reported here was to investigate how much attention is paid to warning labels and branding on alcohol beverage containers, and how individual differences in this are associated with individual differences in drinking behaviour and motivation to change it. In both studies, we measured participants’ eye movements towards brand information and warning labels whilst they viewed alcohol beverage containers. Study 2.1 was an exploratory study that gathered descriptive information about how much attention alcohol consumers pay to health information and investigated correlations between attention and drinking habits. We hypothesized that heightened motivation to reduce drinking would be associated with increased attention to health warnings. In study 2.2, we experimentally manipulated motivation to reduce drinking and attention to health warnings in order to investigate the causal relationships between them.

2.3 Study 2.1

2.3.1 Method

Participants

Sixty participants (63% female) were recruited via online advertisements circulated among students and staff of the University of Liverpool. The sample size was based on previous research on attention to warning labels in alcohol print advertisements (Thomsen & Fulton, 2007). Participants were eligible to take part if they were aged over 18 and did not wear glasses. The majority were alcohol consumers ($n = 58$). Their mean age was 21.27 (SD = 3.61). They had a mean Alcohol Use Disorders Identification Test (AUDIT) score of 10.67 (SD = 6.54) and drank on average 32.12 (SD = 29.15) UK units in the 14 days prior to the experiment (1 UK unit = 8g of alcohol). Based on the AUDIT cut-off scores recommended by García, Novalbos, Martínez, and O'Ferrall (2016), 22 participants (68.2% female) were classified as low-risk drinkers, 22 participants (63.6% female) as high-risk drinkers and 22 participants (68.2% female) were classified as drinkers with physical-psychological problems and probable alcohol dependence. The study received ethical approval from the University of Liverpool Research Ethics Committee.

Materials

Stimuli

We photographed 50 beverage containers (bottles or cans) of various brands and types of alcoholic and non-alcoholic beverages that included health/warning labels (i.e., UK warning label on alcohol containers, nutrition information on soda containers). We photographed 25 alcohol containers (11 bottles/cans of beer, 6 cans of pre-mixed cocktails, 3 bottles/cans of cider, 3 bottles of alcopops and 2 bottles of wine) and 25 soda containers (23 bottles/cans of carbonated soft drinks and 2 bottles of fruit juice). We took four photographs of each container,

two of the front and two of the back. One front and one back picture depicted the whole bottle or can, whereas a different picture depicted a close-up of the front label and the back label. The location of the alcohol warning labels varied between the containers. All aspects of the warning labels were visible and readable in the close-up during the viewing task. Most warning labels were in compliance with the guidelines specified in the responsibility deal and included the alcohol content, the daily guidelines for alcohol consumption, a pregnancy warning, an optional link to drinkaware.co.uk, and an optional responsibility statement. Two labels also included nutrition information. Three labels did not meet the minimum requirements: they did not include the daily recommended guidelines, and two of these also did not include a pregnancy warning. Nevertheless, we included these labels in our analyses as research has shown that 22.4% of alcohol warning labels did not comply with the responsibility deal guidelines (Petticrew et al., 2015). Therefore, our stimuli were representative of the warning labels used in the UK.

Eye-tracker task

Participants were asked to view images of beverage containers (viewing phase) before their memory for the containers was tested (recognition phase; the latter was included to encourage participants to pay close attention during the viewing phase). In the viewing phase participants viewed 40 containers from the stimulus set (20 alcohol, 20 soda). They were instructed to use the arrow keys to manipulate the display of the containers. The left and right arrow keys were used to alternate between front and back. The up arrow was used to zoom in on the label and the down arrow was used to zoom out. Each container was presented for 15s and participants were free to manipulate the presentation of the container in any way they liked. Whether the ‘zoomed out’ front or back of the container was presented first was randomized on a trial-by-trial basis. To ensure that all participants had the same starting position at image onset, participants were instructed to look at a fixation cross that was

presented for 1s before the trial started. Participants' eye movements (gaze position) were measured using an ASL Eye-Trac D6 (Applied Science Laboratories, Bedford, MA) at a sampling rate of 120 Hz. A head rest was used to ensure that participants' head position was fixed in place during eye tracking.

In the recognition phase, participants were shown a second set of 20 images (10 new and 10 of the 40 that had been presented during the viewing phase) and were asked to indicate whether or not each image had been present in the previous set by pressing a "yes" or "no" button. Recognition accuracy was defined as the percentage of correct trials. Participants correctly answered $M = 95.83\%$ ($SD = 5.38$) of the recognition trials.

Questionnaires

Alcohol Use Disorders Identification Test (AUDIT; Saunders, Aasland, Babor, de la Fuente, & Grant, 1993)

The AUDIT is a 10-item screening instrument assessing hazardous patterns of alcohol use and dependence symptoms. An example of an item is "How often do you have six or more drinks on one occasion?". Each item is answered in a multiple choice format (e.g. "never", "less than monthly", "monthly", "weekly" or "daily or almost daily"). Scores range between 0 and 40. AUDIT scores of 8 or higher are indicative of hazardous or harmful drinking patterns (Saunders et al., 1993). The AUDIT has good test-retest reliability, internal reliability and construct validity (de Meneses-Gaya, Zuardi, Loureiro, & Crippa, 2009).

14-day retrospective timeline follow-back diary (TLFB; Sobell & Sobell, 1992)

Participants were required to sum up for every day of the past two weeks, how many alcoholic drinks they had consumed in UK units. The TLFB has high test-retest reliability and good concurrent validity (L. C. Sobell & Sobell, 1992; M. B. Sobell, Sobell, Klajner, Pavan, & Basian, 1986).

Temptation Restraint Inventory (TRI; R. Lorraine Collins & Lapp, 1992) – Restraint subscale

The TRI restraint subscale is a 3-item scale answered on a 9-point Likert scale with anchors “never” and “always”. An example of an item is “How often do you attempt to cut down the amount you drink?”. Scores on the TRI restrain subscale range between 3 and 21. The TRI has adequate internal reliability and concurrent validity (R. Lorraine Collins & Lapp, 1992).

Readiness to Change Questionnaire (RTCQ; Rollnick, Heather, Gold, & Hall, 1992)

The RTCQ is a questionnaire with three subscales (Precontemplation, Contemplation, and Action). The subscales are 4-item scales answered on a 5-point Likert scale with anchors “strongly disagree” and “strongly agree”. Examples of items are “I don’t think I drink too much” (precontemplation subscale), “I enjoy my drinking, but sometimes I drink too much” (contemplation subscale), and “I am trying to drink less than I used to” (action subscale). Scores on each RTCQ subscale range between -8 and 8. The RTCQ has good internal reliability and concurrent validity (Rollnick et al., 1992).

Contemplation ladder (LaBrie, Quinlan, Schiffman, & Earleywine, 2005)

The contemplation ladder is an 11-point scale on which participants are required to indicate their readiness to reduce their drinking (ranging from 0 “No thought of reducing how much I drink per occasion” to 10 “Taking action to reduce the number of drinks I have per occasion”). The contemplation ladder has good concurrent validity (LaBrie et al., 2005).

Dutch Eating Behaviour Questionnaire (DEBQ; van Strien, Frijters, Bergers, & Defares, 1986) – Restraint subscale

Dietary restraint was measured with the DEBQ Restraint subscale. This is a 10-item scale answered in a multiple choice format (“not relevant”, “never”, “seldom”, “sometimes”, “often”, “very often”). An example of an item is “Do you watch exactly what you eat?”. Scores

on the DEBQ Restraint subscale range between 10 and 50. The DEBQ Restraint subscale has high internal reliability and test-retest reliability (Allison, Kalinsky, & Gorman, 1992) and good construct validity (Laessle, Tuschl, Kotthaus, & Pirke, 1989). The DEBQ was included to control for individual differences in dietary restraint, as concerns about the calorie content of drinks might affect attention to warning labels.

Procedure

After providing informed consent, participants completed the eye-tracker task. Then, they completed the questionnaire battery on a computer. A motivation to reduce drinking score was created by averaging the TRI restraint subscale, the RTCQ contemplation and action subscales and the contemplation ladder as these scales were strongly correlated ($r = .53 - .80$, $ps < .001$). Finally, participants were thanked and debriefed. Participants received study credits or a £5 shopping voucher.

Data preparation and analysis

On each container, Areas of Interest (AOIs) were created by assigning the warning label and any calorie information to the category Health; any brand information, such as the logo and any brand messages to the category Brand; and everything else (e.g., barcode, recycling logo, blank packaging material) to the category Rest. The relative size of each AOI was calculated by dividing the number of pixels in the area by the total number of pixels of the container. The complexity of each AOI was calculated by dividing the compressed file size by the uncompressed file size (Forsythe, Mulhern, & Sawey, 2008). Brightness and contrast values for each AOI were obtained using GNU Image Manipulation Program 2.

The different containers varied considerably in their visual characteristics (see Table 2.1), and conventional multivariate statistics are unable to control for this within-stimulus

variability. Therefore, we used multilevel modelling to analyse eye movements. Data were organised in three levels, with AOIs (Brand, Health, Rest; level 1) nested in individual containers (40 containers; level 2) nested in data from each individual participant (level 3). To eliminate noise due to inaccurate eye-tracking, trials in which participant spent less than 50% of the viewing time looking at the product (Health, Brand and Rest combined – the only stimuli on the screen) were excluded from the analyses (12%). This percentage is similar to previous research on visual attention to tobacco warning labels, in which 8% (Maynard et al., 2013) to 14% (Süssenbach et al., 2013) of participants were excluded from analyses due to inaccurate tracking.

We created multilevel models to analyse the effect of stimulus characteristics and drinking habits on fixation time. AOI (brand, health, rest (reference category, dummy coded)), order of presentation, size, complexity, brightness, and contrast were level 1 predictors; picture type (alcohol, soda (reference category)) was a level 2 predictor; and motivation to reduce drinking, alcohol consumption, AUDIT scores and dietary restraint were level 3 predictors. The models included random intercepts for all three levels.

In Model 1, we included all level 1 and level 2 predictors and their first and second order interactions with AOI and picture type. Model 1 showed that stimulus characteristics significantly influenced attention to the different AOIs on alcohol and soda packaging. In Model 2, we included all level 3 predictors and their first and second order interactions with AOI and picture type. A chi-squared test showed that Model 2 was a significantly better fit than Model 1 ($\chi^2(24) = 1015.93, p < .001$), indicating that both participant characteristics and stimulus characteristics predicted fixation time.

1.

2.

3.

4.



5.

6.



Figure 2.1. Studies 2.1 and 2.2. Stimulus examples. Top row: Example of stimuli in viewing task (studies 2.1 and 2.2). Four photographs were taken of each container, two of the front and two of the back. One front and one back picture depicted the whole bottle or can (no. 1 and no. 2, respectively), whereas a different picture depicted a close-up of the front label (no. 3) and the back label (no. 4). Bottom row: Example of stimuli in manipulation of attention task (study 2.2). Participants were encouraged to focus attention on brand (no. 5) or health information (no. 6).

Table 2.1. Studies 2.1 and 2.2. Stimulus characteristics.

Variable	Alcohol (n = 20)			Soda (n = 20)		
	Brand	Health	Rest	Brand	Health	Rest
	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>
Size (% of total container)	34.24 (12.56) ^a	4.25 (3.38) ^b	61.51 (15.04) ^c	25.10 (10.90) ^d	5.47 (2.88) ^b	69.42 (12.21) ^c
Complexity (compression ratio)	.22 (.04) ^a	.27 (.06) ^b	.10 (.02) ^c	.26 (.03) ^d	.22 (.07) ^d	.12 (.02) ^e
Brightness (average luminosity)	111.92 (44.07) ^a	105.78 (53.48) ^a	91.54 (37.22) ^a	128.21 (36.87) ^a	118.19 (48.83) ^a	107.45 (38.19) ^a
Contrast (luminosity variance)	59.07 (11.71) ^a	48.58 (15.46) ^b	54.22 (12.33) ^a	59.07 (11.71) ^a	46.79 (11.92) ^b	52.70 (13.05) ^a

Note: Comparisons are between means in the same row. Different superscripts indicate a significant difference between means ($p < .05$).

2.3.2 Results

Attention to branding and health warnings (Figure 2.2)

Over the 15s viewing period, participants looked at alcohol warning labels for 1.03s ($SD = 0.89$, 7%). A drink type (alcohol, soda) \times AOI (brand, health, rest) repeated measures ANOVA revealed significant main effects of drink type ($F(1, 56) = 63.97$, $p < .001$, $\eta^2_p = .53$) and AOI ($F(2, 112) = 84.47$, $p < .001$, $\eta^2_p = .60$) that were qualified by a significant interaction ($F(2, 112) = 71.09$, $p < .001$, $\eta^2_p = .56$). Post-hoc comparisons showed that participants spent less time viewing health information than brand information (alcohol $t(58) = 14.36$, $p < .001$, $d = 1.87$; soda $t(56) = 7.17$, $p < .001$, $d = 0.95$) and the rest of the packaging (alcohol $t(58) = 10.62$, $p < .001$, $d = 1.38$; soda $t(56) = 12.95$, $p < .001$, $d = 1.71$). Participants also looked longer at alcohol branding than the rest of the packaging, $t(58) = 6.73$, $p < .001$, $d = 0.88$, but less long at soda branding than the rest of the packaging, $t(56) = 2.21$, $p = .03$, $d = 0.29$. Participants attended more to alcohol than soda branding, $t(56) = 11.78$, $p < .001$, $d = 1.56$, and less to the rest of alcohol than soda packaging, $t(56) = 4.44$, $p < .001$, $d = 0.59$, but spent similar amounts of time viewing health warnings on alcohol and soda products, $t(56) = .91$, $p = .37$, $d = 0.12$.

Stimulus characteristics

The multilevel models revealed that the visual characteristics of branding and warning labels significantly affected attention. Alcohol warning labels were attended to longer when they were larger in size and less complex (see supplementary analyses for discussion).

Individual differences

Model 2 revealed a significant motivation to reduce drinking \times AOI brand (vs health and rest) \times picture type interaction (see Table 2). Motivation to reduce drinking was negatively

associated with attention to branding on alcohol packaging. There was also a significant motivation to reduce drinking \times AOI health (vs brand and rest) \times picture type interaction: motivation to reduce drinking was negatively associated with attention to health warnings on alcohol packaging. Taken together, these results indicate that participants high in motivation to reduce drinking paid less attention to alcohol branding and health warnings and more attention to the rest of the packaging. Recent alcohol consumption and AUDIT scores were not significant predictors of attention. There was a significant association between dietary restraint and attention to branding, which is discussed in the supplementary analyses.

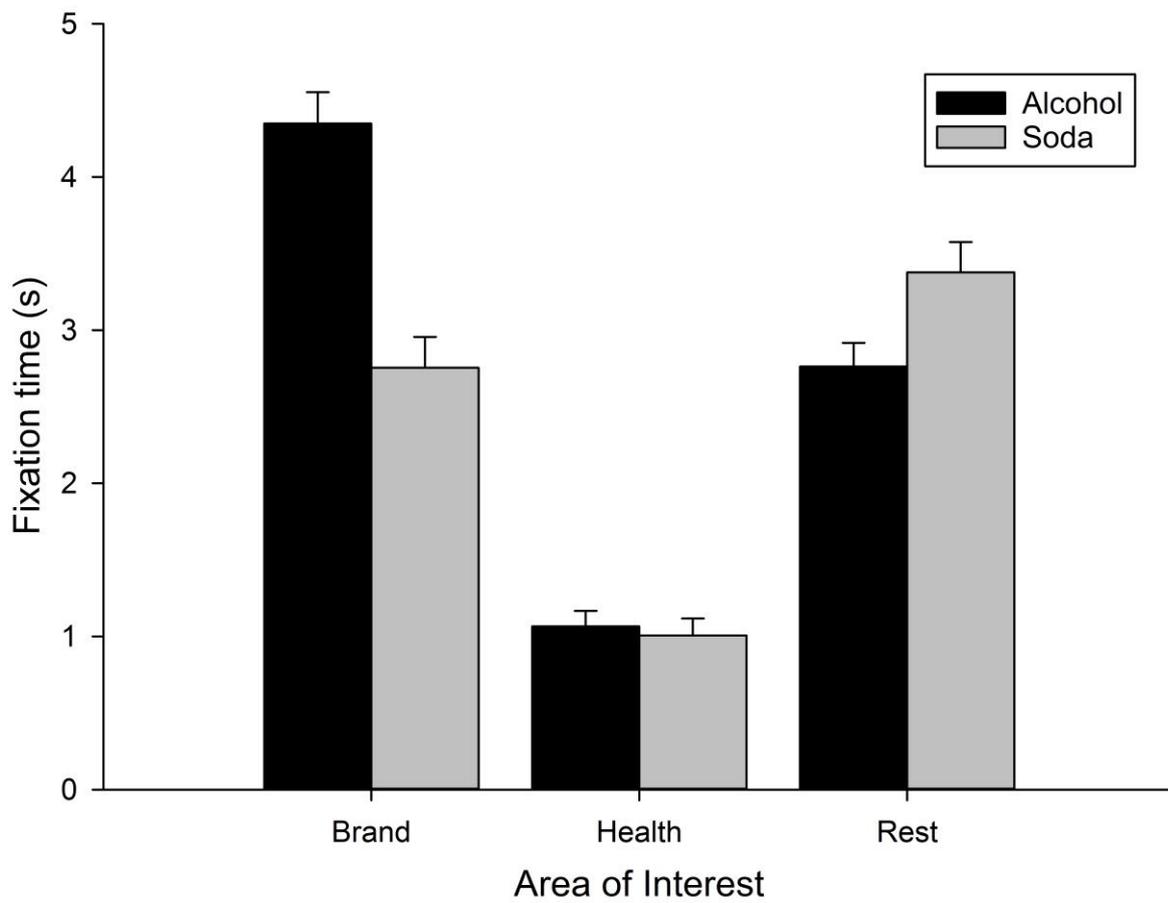


Figure 2.2. Visual attention to the different areas of interest (Brand, Health, Rest) on alcohol and soda packaging. Bars represent raw mean fixation time (s) averaged out across trials. Error bars indicate SEM.

Table 2.2. Study 2.1. Multilevel regression model including stimulus-level and participant-level predictors. Area of Interest (AOI; Brand, health, rest, dummy coded with rest as reference category), brightness, contrast, complexity, and size were level 1 (AOI-level) predictors. Picture type (Alcohol, soda, dummy coded with soda as reference category) and presentation order were level 2 (Picture level) predictors. AUDIT scores, recent alcohol consumption, motivation to reduce drinking and dietary restraint were level 3 (Participant level) predictors. All predictors were included as individual main effects and in all possible two-way and three-way interactions with picture type and AOI.

	Main effect	Two-way interactions			Three-way interactions.	
		× Picture type	× AOI brand	× AOI health	× AOI brand × Picture type	× AOI health × Picture type
	b (SE)	b (SE)	b (SE)	b (SE)	b (SE)	b (SE)
Intercept	3.22 (0.84)	-	-	-	-	-
AOI brand	-3.73 (1.20)**	0.88 (1.72)	-	-	-	-
AOI health	-2.95 (0.97)**	0.18 (1.29)	-	-	-	-
Picture type	-0.61 (1.09)	-	0.88 (1.72)	0.18 (1.29)	-	-
Order	0.01 (0.01)	-0.01 (0.01)*	0.00 (0.01)	-0.003 (0.01)	0.01 (0.01)	0.01 (0.01)
Brightness	-0.001 (0.002)	-0.001 (0.003)	0.002 (0.003)	0.001 (0.003)	0.01 (0.01)	0.002 (0.004)
Contrast	-0.01 (0.01)*	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	-0.01 (0.01)	0.01 (0.01)

Table 2.2 continued

Variable	Main effect b (SE)	Two-way interactions			Three-way interactions.	
		× Picture type b (SE)	× AOI brand b (SE)	× AOI health b (SE)	× AOI brand × Picture type b (SE)	× AOI health × Picture type b (SE)
Complexity	11.12 (4.18)**	-1.90 (5.98)	-8.624 (4.83) ⁺	-10.46 (4.27)*	2.41 (6.62)	-0.76 (6.13)
Size	-0.01 (0.01)	0.01 (0.01)	0.02 (0.01)*	0.08 (0.03)*	0.02 (0.04)	-0.02 (0.01) ⁺
AUDIT	-0.004 (0.02)	0.01 (0.02)	0.03 (0.02)	0.004 (0.02)	-0.04 (0.03)	-0.004 (0.03)
Alcohol consumption (last 14 days)	0.002 (0.01)	-0.004 (0.01)	-0.002 (0.01)	-0.01 (0.01)	0.003 (0.01)	0.01 (0.01)
Motivation to reduce drinking	-0.04 (0.03) ⁺	0.08 (0.04)**	0.01 (0.03)	0.05 (0.03) ⁺	-0.08 (0.04)**	-0.09 (0.04)*
Dietary restraint	-0.02 (0.01)*	-0.02 (0.01)	0.02 (0.01)*	0.01 (0.01)	0.02 (0.01)	0.02 (0.01)

Table 2.2 continued

Random effects	Residual variance	Proportion residual variance explained
Level 3	0.14 (0.03)	1.46%
Level 2	3.18 (0.06)	17.15%
Level 1	0 (0)	-
$\chi^2(24)$	894.27***	

Note: + $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

2.3.3 Supplementary analyses

Stimulus size

The multilevel model revealed a significant size \times AOI health (vs brand and rest) interaction ($b = 0.08$, $SE = 0.03$, $p = .01$) and a non-significant size \times AOI health \times picture type interaction ($b = 0.02$, $SE = 0.04$, $p = .60$), indicating that larger health warnings were attended to longer, regardless of picture type. The size \times AOI brand (vs health and rest) interaction ($b = 0.02$, $SE = 0.01$, $p = .05$) was significant, and the size \times AOI brand \times picture type interaction was not significant ($b = -0.02$, $SE = 0.01$, $p = .10$), indicating that larger branding on soda packaging attracted more attention, but larger branding on alcohol packaging attracted less attention.

Stimulus complexity

The multilevel model revealed a significant complexity \times AOI health interaction ($b = -10.46$, $SE = 4.23$, $p = .01$) and a non-significant complexity \times AOI health \times picture type interaction ($b = -0.8$, $SE = 6.13$, $p = .90$), indicating that more visually complex health warnings were attended to less, regardless of picture type. The complexity \times AOI brand interaction ($b = -8.62$, $SE = 4.83$, $p = .07$) was not significant, and the complexity \times AOI brand \times picture type interaction was non-significant ($b = 2.41$, $SE = 6.62$, $p = .72$), indicating that more complex branding attracted less attention, regardless of picture type.

Dietary restraint

The multilevel model revealed a significant dietary restraint \times AOI brand interaction ($b = 0.02$, $SE = 0.01$, $p = .03$). Participants with higher dietary restraint fixated longer on branding. A non-significant dietary restraint \times AOI brand \times picture type interaction ($b = 0.02$, $SE = 0.01$, $p = .11$) showed that this relationship was regardless of picture type. The dietary restraint \times AOI health interaction ($b = 0.01$, $SE = 0.01$, $p = .16$) and the dietary restraint \times

AOI health \times picture type interaction ($b = 0.02$, $SE = 0.01$, $p = .28$) were non-significant. This indicates that participants high in dietary restraint did not compensate their decreased attention to branding by increasing attention to health warnings, but instead by increasing attention to the rest of the packaging, both for alcohol and soda containers.

2.4 Study 2.2

In study 2.2, we investigated the causal relationship between motivation to reduce drinking and attention allocation to branding/health warnings. First, to manipulate motivation to reduce drinking participants received a brief intervention regarding their drinking, or a control intervention. As the brief intervention predominantly targets people who drink in excess of the UK drinking guidelines, we recruited heavy drinkers. After the intervention, we measured attention to alcohol packaging. We hypothesized that participants would pay more attention to warning labels (and less to branding) after the alcohol intervention than the control intervention. Second, we manipulated attention to alcohol packaging so that participants either had to attend to warning labels or brand information. We used drinking intentions as the outcome measure, because they predict consumption (Huchting et al., 2008) and are affected by changes in motivation to reduce drinking (Kaysen, Lee, Labrie, & Tollison, 2009). We hypothesized that participants who attended to health warnings would intend to drink less in the subsequent week than those who attended to branding.

2.4.1 Method

Participants

One hundred and twenty participants (65% female) were recruited via online advertisements circulated among students and staff at the University of Liverpool (see Table 2.3). They were eligible for participation if they were aged over 18, did not wear glasses and

consumed more alcohol than the recommended UK guidelines (14 units/week for females, 21 units/week for males)⁴. There was no formal screening in place to check whether participants fulfilled these criteria prior to taking part, but the eligibility criteria were emphasized at multiple times prior to the start of the lab session. The study received ethical approval from the University of Liverpool Research Ethics Committee.

Materials

Stimuli

We used the same stimuli and questionnaires as in study 2.1. Because the contemplation ladder was administered after the manipulation, baseline motivation to reduce drinking was defined as the average of the TRI restraint scale and RTCQ contemplation and action subscales, which were strongly correlated ($r = .52 - .68, ps < .001$).

Drinking intentions

To measure drinking intentions, participants were asked how many pints of cider/beer, large glasses of wine, and shots of hard liquor they intended to drink in the next week (Glock & Krolak-Schwerdt, 2013). Their responses were combined into a single measure of intended consumption in UK units. Binge drinking intentions were measured with three 9-point Likert scales (e.g., “*Do you plan to binge-drink in the next week?*” (Elliott & Ainsworth, 2012)). The scores were averaged into a single binge drinking measure ($\alpha = .97$). Note: participants were not provided with a definition of binge drinking before responding to these items.

Viewing task

The eye-tracker task was the same as in study 2.1, with the exception that participants only viewed 30 containers during the viewing phase (15 alcohol, 15 soda) and 12 containers

⁴ Recruitment for this study took place from May 2014 – September 2015, before the UK guidelines were revised (January 2016).

in the recognition phase.

Screening and Intervention Programme for Sensible drinking (SIPS) brief advice tool (Kaner et al., 2013) and Control

Participants were informed about their AUDIT scores and alcohol consumption, and the associated health risks, before receiving advice about population norms and the benefits of cutting down, followed by individualised tips to reduce their drinking (see Figure 2.3). For the control condition, participants received brief advice on study habits. The advice closely followed the SIPS procedure, providing participants with information about different ways to study and their associated benefits and tailored tips to improve their own study habits (see Figure 2.4). The SIPS brief advice tool and control advice tool were administered by IK, who did not receive any training in administering this brief advice.

Manipulation of attention task

Participants were informed that important information for the subsequent memory test would be highlighted. They viewed the back and front labels of 15 alcoholic drinks containers with a bright yellow border around either the warning label or the brand information. To manipulate attention, in the health exposure condition, the majority of the labels had a border around the warning label (13 labels, 86%), whereas in the brand exposure condition, the border was around the brand information (see Figure 2.1).

Procedure

After giving consent, participants filled out the alcohol diary, AUDIT, TRI, and RTCQ. Then, half of the participants received brief advice on sensible alcohol consumption (alcohol advice condition), whilst the other half received brief advice about study habits (control condition). Then, participants did the viewing task. They were asked to indicate their motivation to reduce drinking on the contemplation ladder before and after the task. After this,

participants received the manipulation of attention task. Half of the participants in the alcohol advice and control condition were allocated to the brand exposure condition and the other half were allocated to the health exposure condition. Allocation to the advice conditions and attention conditions was randomized. Then, participants completed the drinking intentions questionnaire and the DEBQ, followed by a bogus memory task to corroborate the stated aim of the manipulation of attention task. Finally, participants were thanked and debriefed. Participants received study credits or a £5 high street voucher.

Data preparation and analyses

We employed the same data preparation and analysis strategy for the viewing task as in study 2.1. Trials in which participants spent less than 50% of the viewing time looking at the stimuli were removed due to inaccurate tracking (9%). A model with the level 1 and level 2 predictors (Model 1) was compared with Model 2, which also included condition (alcohol advice vs control), and baseline motivation to reduce drinking as participant-level predictors (level 3). A chi-squared test showed that Model 2 was a significantly better fit than Model 1 ($\chi^2(12) = 31.72, p < .001$), which indicates that the level 3 variables predicted fixation time above and beyond stimulus characteristics.

Table 2.3. Study 2.2. Participant characteristics for each advice condition (alcohol, control) and exposure condition (brand, health).

Variable	Alcohol advice (<i>n</i> = 60)		Control advice (<i>n</i> = 60)	
	Brand exposure	Health exposure	Brand exposure	Health exposure
	(<i>n</i> = 30)	(<i>n</i> = 30)	(<i>n</i> = 30)	(<i>n</i> = 30)
	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)
Gender (% female)	66.7%	60%	66.7%	66.7%
Age	24.27 (10.26)	22.27 (4.58)	25.33 (8.02)	25.10 (11.05)
AUDIT ($\alpha = .66$)	13.37 (5.37)	13.33 (5.42)	13.10 (4.25)	13.07 (4.63)
Alcohol consumption (last 14 days)	48.13 (26.48)	51.23 (23.54)	47.00 (17.37)	48.27 (23.05)
Baseline motivation to reduce drinking ($\alpha = .81$)	1.61 (3.64) ^a	2.90 (3.92) ^a	4.51 (2.95) ^b	2.64 (3.55) ^a
DEBQ Restraint ($\alpha = .92$)	34.73 (8.08)	35.30 (10.48)	34.47 (8.93)	34.53 (10.92)

Note: Different superscripts indicate significant group differences at $p < .05$.

This is one standard drink...

Half pint of regular beer, lager or cider
One small glass of wine
One single measure of spirits
One small glass of sherry
One single measure of aperitifs

How many standard drinks do you drink in a week?

...and each of these is more than one standard drink.

2 A pint of regular beer, lager or cider
3 A pint of premium beer, lager or cider
1.5 Alcopop or a can/bottle of regular lager
2 440ml can of premium lager or strong beer
4 440ml can of super strength lager
2 175mm glass of wine
9 Bottle of wine

This table tells you if you are at risk from drinking alcohol.

Risk	Men	Women	Common Effects
LOW RISK	21 units or fewer per week or up to 4 units per day - with two alcohol-free days	14 units or fewer per week or up to 3 units per day - with two alcohol-free days	<ul style="list-style-type: none"> Increased relaxation Reduced risk of heart disease Sociability
INCREASED RISK	22 - 49 units per week or regular drinking of more than four units per day	15 - 35 units per week or regular drinking of more than three units per day	<ul style="list-style-type: none"> Less energy Depression/stress Insomnia Impotence Risk of injury High blood pressure
HIGH RISK	50 or more units per week	36 or more units per week	<ul style="list-style-type: none"> All of the above and... Memory loss Risk of liver disease Risk of cancer Risk of alcohol dependence

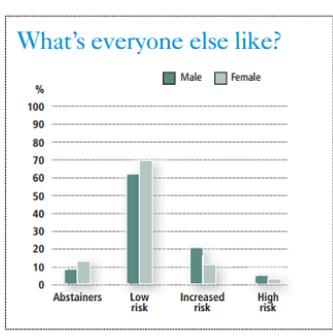
Binge drinking is considered to be drinking twice the daily limit in one sitting (8 units for men, 6 units for women).

There are times when you will be at risk even after two or three drinks. For example, when exercising, operating heavy machinery, driving or if you are on certain medication.

If you are pregnant, it is recommended that you completely abstain from drinking alcohol.

As well as keeping to weekly and daily limits, it is recommended that two days of the week should be alcohol-free.

How do you feel?
Your screening score suggests you appear to be drinking at a rate that increases your risk of harm and you might be at risk of problems in the future. What do you think?



- The benefits of cutting down**
- Physical**
- Reduced risk of injury
 - Reduced risk of high blood pressure
 - Reduced risk of cancer
 - Reduced risks of liver disease
 - Reduced risks of brain damage
 - Sleep better
 - More energy
 - Lose weight
 - No hangovers
 - Improved memory
 - Better physical shape
- Psychological/Social/Financial**
- Improved mood
 - Improved relationships
 - Reduced risks of drink driving
 - Save money

- Making your plan**
- Plan activities and tasks at those times you usually drink
 - When bored or stressed have a workout instead of drinking
 - Explore other interests such as cinema, exercise, etc.
 - Avoid going to the pub after work
 - Have your first drink after starting to eat
 - Quench your thirst with non-alcohol drinks before alcohol
 - Avoid drinking in rounds or in large groups
 - Switch to low alcohol beer/lager
 - Take smaller sips
 - Avoid or limit the time spent with "heavy" drinking friends

- What targets should you aim for?**
- Men**
4 or less standard drinks daily
21 or less standard drinks weekly
2 alcohol free days a week
- Women**
3 or less standard drinks daily
14 or less standard drinks weekly
2 alcohol free days a week
(No drinks advised during pregnancy)
- Dependant drinkers**
No drinks are safe



Brief advice about alcohol risk



This brief intervention package is based on the How Much is Too Much? Simple Structured Advice Intervention tool, developed by Newcastle University and the Drink Less materials originally developed at the University of Sydney as part of a W.H.O. collaborative study.

Figure 2.3. SIPS brief advice tool (Kaner et al., 2013; reproduced from "SIPS: Brief Advice Training," n.d.).

These are general study tips...

Take notes Sleep Exercise Take breaks Eat healthy food

How many of these do you do?

...and each of these is a more specific adaptation.

Pretend to take notes for someone else Test yourself Eat oily fish Sleep within 12 hours of studying Study just before going to bed Study in different locations Read the information out loud

This table tells you what type of student you are.

Learning style	Characteristics	Specific tips
TACTILE LEARNER	Learns by touching and doing. Often speaks with their hands and may have difficulty sitting still.	<ul style="list-style-type: none"> Can easily remember things that were done, but may have difficulty remembering things they heard or saw. Understands spoken instructions better than written. Often learns by reading the material out loud.
AUDITORY LEARNER	Stores information by the way it sounds. Often hums or talks to themselves when bored.	<ul style="list-style-type: none"> Record yourself Songs/rhymes Repeat Acronyms Read out loud Study with others Write down key words/ideas Draw pictures Avoid distractions while studying Colour code things Visualize things you see or hear
VISUAL LEARNER	Learns by reading or seeing pictures	<ul style="list-style-type: none"> Chew gum Do hands-on activities whilst studying Draw

A mnemonic is a learning technique that translates information into a form that the brain can remember better than the original form.

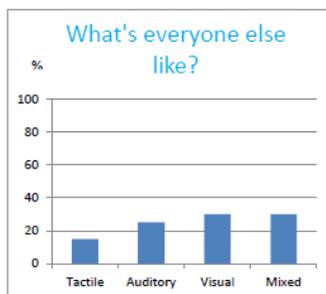
You can make a mnemonic in many different ways. For example, creating a sentence with the same starting letters as the thing you want to remember (Please Excuse My Dear Aunt Sally).

It is recommended you get around 8 hours of sleep each night.

On top of that, losing ONE night's sleep can impair your reasoning and brain functioning for up to four days.

How do you feel?

You saw what type of learner you might be and received specific tips you can use to enhance your memory. What do you think?



The benefits of starting now

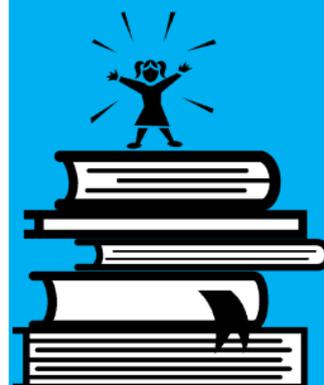
- Takes time to change habits
- Applicable to many aspects of life, not just university
- Trains your brain
- Learn new skills more easily

Making your plan

- Plan study sessions at those times you're usually most active
- When bored, take a quick break or study a different subject
- Study in different locations
- Avoid studying when you're tired
- Set realistic goals
- Limit your caffeine intake
- Eat plenty of fruit and vegetables

What targets should you aim for?

- Study for 30 minutes every day
- Sleep well
- Find an interesting subject to learn to keep your brain active



Brief advice about studying

Figure 2.4. Study advice tool used in the control condition (study 2.3).

2.4.2 Results

Baseline differences

A 2 (advice condition: alcohol, control) \times 2 (exposure condition: brand, health) MANOVA with age, recent alcohol consumption, AUDIT scores and the baseline measure of motivation to reduce drinking as dependent variables revealed significant baseline differences between conditions. There were significant group differences in motivation to reduce drinking for the advice conditions ($F(1, 116) = 4.20, p = .04, \eta^2_p = .04$), which were qualified by a significant advice \times exposure condition interaction on motivation to reduce drinking ($F(1, 116) = 5.99, p = .02, \eta^2_p = .05$). Post-hoc t-tests showed that participants in the control condition had a stronger baseline motivation to reduce drinking than participants in the alcohol advice condition, $t(118) = 2.02, p = .046, d = .37$. This difference between advice conditions was only significant among participants in the brand exposure condition, $t(58) = 3.39, p = .001, d = .88$, and not among those in the health exposure condition, $t(58) = .27, p = .79, d = .07$, see Table 3. There were no significant baseline differences in age, recent alcohol consumption, and AUDIT scores (all $ps > .23$).

Free viewing

Manipulation check

An independent samples t-test revealed no significant difference in contemplation ladder scores between the alcohol advice condition ($M = 4.72, SD = 2.82$) and the control condition ($M = 3.95, SD = 2.94$), $t(118) = 1.46, p = .15, d = .27$. Therefore, the SIPS manipulation did not increase motivation to reduce drinking.

Effects of advice condition on free viewing (Figure 2.5)

Over a 15s viewing period, participants looked at alcohol warning labels for 1.20s ($SD = 0.81, 8\%$). There was a significant AOI brand \times condition interaction, indicating that

participants who received alcohol advice spent less time viewing brand information than those in the control condition (see Table 4). The non-significant AOI brand \times picture type \times condition interaction showed that the relation between condition and attention to branding did not depend on picture type (alcohol vs. soda). The AOI health \times condition and the AOI health \times picture type \times condition interactions were non-significant. This indicates that participants who received alcohol advice did not compensate their reduced attention to branding by increasing attention to health warnings on alcohol or soda containers, but instead increased their attention to the rest of the packaging.

Exposure task

Manipulation check

Participants in the brand attention condition fixated longer on brand ($M = 2.41$, $SD = 1.21$) than health information ($M = 1.05$, $SD = 0.42$) and participants in the health attention condition fixated longer on health ($M = 2.13$, $SD = 1.05$) than brand information ($M = .86$, $SD = .53$; $F(1,116) = 133.24$, $p < .001$, $\eta^2_p = .58$). Therefore, the manipulation of attention was successful.

Effect of attention to brand and health information on drinking intentions

A 2 (exposure; brand, health) by 2 (condition; alcohol advice, control) MANOVA with binge drinking intentions and intended consumption as the DVs showed that exposure did not significantly affect drinking intentions (Multivariate $F(2, 115) = .47$, $p = .62$, $\eta^2_p = .01$). Neither did condition (Multivariate $F(2, 115) = 1.94$, $p = .15$, $\eta^2_p = .03$), or the interaction between exposure and condition (Multivariate $F(2,115) = .64$, $p = .53$, $\eta^2_p = .01$).

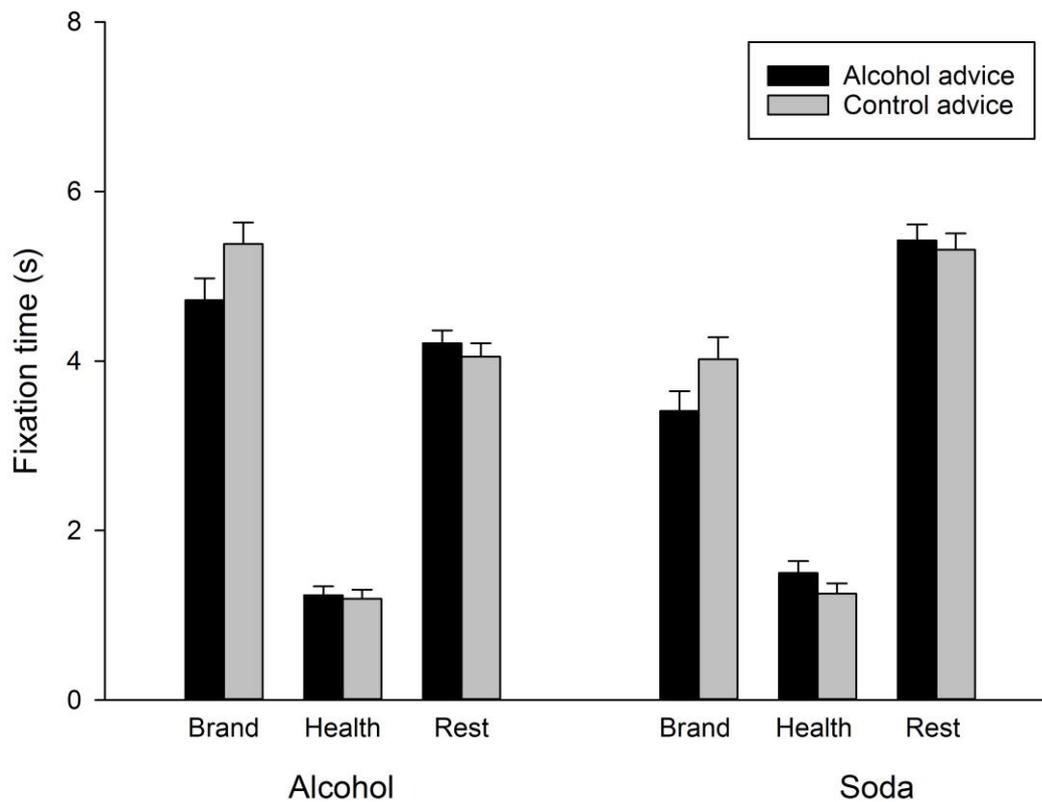


Figure 2.5. Effect of condition (alcohol advice, control) on visual attention to AOIs (brand, health, rest) on alcohol and soda packaging. Alcohol advice reduced attention to branding on alcohol and soda packaging. Bars represent raw mean fixation time (s) averaged out across trials. Error bars indicate SEM.

Table 2.4. Study 2.2. Multilevel regression model including stimulus-level and participant-level predictors. Area of Interest (AOI; Brand, health, rest, dummy coded with rest as reference category), brightness, contrast, complexity, and size were level 1 (AOI-level) predictors. Picture type (Alcohol, soda, dummy coded with soda as reference category) and presentation order were level 2 (Picture level) predictors. Advice condition (Alcohol, control, dummy coded with control as reference category) and baseline motivation to reduce drinking were level 3 (Participant level) predictors. All predictors were included as individual main effects and in all possible two-way and three-way interactions with picture type and AOI.

	Main effect	Two-way interactions			Three-way interactions	
	<i>b</i> (<i>SE</i>)	x picture type <i>b</i> (<i>SE</i>)	x AOI brand <i>b</i> (<i>SE</i>)	x AOI health <i>b</i> (<i>SE</i>)	x AOI brand × picture type <i>b</i> (<i>SE</i>)	x AOI health × picture type <i>b</i> (<i>SE</i>)
Intercept	1.78 (1.45)	-	-	-	-	-
AOI brand	-0.26 (2.14)	-22.46 (3.04)***	-	-	-	-
AOI health	-0.54 (1.72)	-8.46 (2.23)***	-	-	-	-
Picture type	8.46 (1.93)***	-	22.46 (3.04)***	-8.46 (2.23)***	-	-

Table 2.4 continued

Variable	Main effect	Two-way interactions			Three-way interactions	
	<i>b (SE)</i>	x picture type <i>b (SE)</i>	x AOI brand <i>b (SE)</i>	x AOI health <i>b (SE)</i>	x AOI brand × picture type <i>b (SE)</i>	x AOI health × picture type <i>b (SE)</i>
Order	-0.01 (0.01)	0.02 (0.02)	-0.02 (0.02)	0.01 (0.02)	-0.002 (0.02)	-0.01 (0.02)
Brightness	0.005 (0.003)+	-0.03 (0.01)***	-0.01 (0.01)	-0.01 (0.01)	0.10 (0.01)***	0.04 (0.01)***
Contrast	-0.01 (0.01)	-0.15 (0.02)***	0.003 (0.01)	0.01 (0.01)	0.16 (0.02)***	0.15 (0.02)***
Complexity	10.98 (7.94)	23.85 (11.08)*	-4.14 (9.06)	-10.41 (8.20)	-18.89 (12.32)	-30.03 (11.36)**
Size	0.03 (0.01)**	0.01 (0.01)	0.04 (0.02)*	-0.02 (0.06)	0.14 (0.03)***	0.20 (0.07)**

Table 2.4 continued

Variable	Main effect	Two-way interactions			Three-way interactions	
	<i>b (SE)</i>	x picture type <i>b (SE)</i>	x AOI brand <i>b (SE)</i>	x AOI health <i>b (SE)</i>	x AOI brand × picture type <i>b (SE)</i>	x AOI health × picture type <i>b (SE)</i>
Advice condition	0.03 (0.27)	0.37 (0.32)	-0.69 (0.29)*	0.11 (0.29)	-0.45 (0.40)	-0.51 (0.40)
Baseline motivation to reduce drinking	-0.01 (0.04)	0.04 (0.04)	-0.02 (0.04)	0.03 (0.04)	-0.07 (0.06)	-0.06 (0.06)
Random effects	Residual variance	Proportion residual variance explained				
Level 3	0.55 (0.12)	-29.67%				
Level 2	4.29 (0.26)	12.76%				
Level 1	16.97 (0.29)	35.1%				
$\chi^2(47)$	31.72**					

Note: ⁺ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

2.5 Discussion

In two studies, we investigated alcohol consumers' attention to warning labels on alcohol packaging, and how this is associated with individual differences in motivation to reduce drinking. The results showed that people paid minimal attention to warning labels on alcohol packaging (7 - 8% of total viewing time). In study 2.1, we demonstrated that self-reported motivation to reduce drinking reduced attention to both branding and warning labels on alcohol packaging. Although we did not replicate this association in study 2.2, we did demonstrate that a brief alcohol intervention reduced attention to branding, although this effect was not specific for alcohol packaging and the brief alcohol intervention did not influence participants' motivation to reduce drinking. Contrary to hypotheses, our experimental manipulation that encouraged participants to focus their attention on warning labels did not affect their drinking intentions for the subsequent week.

A possible explanation is that participants do not particularly notice warning labels, due to their current design (Laughery, Young, Vaubel, & Brelsford, 1993; Petticrew et al., 2015). Our results show that alcohol warning labels on average take up less than 5% of the packaging and that attention to warning labels is roughly proportional to their size. Additionally, our results suggest that large alcohol warning labels attracted more attention, but we did not experimentally test this. Research regarding tobacco labels supports this: larger labels increased message recall compared to smaller labels (Truitt et al., 2002). Another explanation is that participants do not see the current warning label as goal-relevant. This might be because it does not show the consequences of exceeding the recommended guidelines. Additionally, research suggests that "drink responsibly" messages (as included in the UK warning labels) are primarily used as a means to promote drinking (Pettigrew, Biagioni, et al., 2016; K. C. Smith, Cukier, & Jernigan, 2014; S. W. Smith et al., 2009) rather than raise awareness of the harmful consequences of alcohol consumption. Therefore,

participants who are motivated to reduce drinking might view them as another part of the product branding, and subsequently avoid them. Indeed, some researchers argue that alcohol warning labels should be more like tobacco warnings and nutrition labels and provide clear information about alcohol-related risks and unambiguous behavioural recommendations in order to increase their effectiveness (Al-hamdani, 2014; Martin-Moreno et al., 2013).

Indeed, Al-hamdani and Smith (Al-hamdani & Smith, 2015) demonstrated that warning labels that provided unambiguous information about the effect of alcohol consumption on liver cancer made people perceive the product more negatively compared to non-labelled products. Similarly, warning labels about cancer also increased participants' intentions to reduce drinking (Pettigrew, Jongenelis, et al., 2016; Wigg & Stafford, 2016) and reduced participants' drinking speed (Stafford & Salmon, 2016), regardless of whether the warning label was text-only or included a picture of liver cancer. Another recent study showed that the inclusion of a self-affirming implementation intention in addition to the standard UK warning label reduced alcohol consumption at one month follow-up (Armitage & Arden, 2016). Research on the effect of alcohol-related public health campaigns demonstrated that exposure to public health campaigns affected urge to drink via increased negative affect in response to the campaigns (Stautz & Marteau, 2016). This suggests that alcohol warning labels might need to elicit negative emotions in order to reduce consumption. Future research should explore the effect of label design and content on attention. Increasing the visual salience of warning labels by using plain packaging (Maynard et al., 2013; Munafò et al., 2011), graphic warnings (Süssenbach et al., 2013) and front-of-pack labelling (D. J. Graham, Orquin, & Visschers, 2012) might be more effective in attracting and maintaining attention, as shown in tobacco and food research.

In study 2.1, we found a negative association between motivation to reduce drinking and attention to warning labels on alcohol packaging, contradicting our hypothesis. It is

possible that people who are motivated to reduce drinking, feel ashamed or guilty about their current drinking habits if they have been unsuccessful in their goal. Warning labels that remind participants of the discrepancy between their goals and behaviour might therefore be threatening to some participants. Research showed that smokers disengaged from threatening health information more than non-threatening health information (Kessels, Ruiter, & Jansma, 2010). So, participants who were motivated to reduce drinking might have reduced their attention to warning labels to avoid negative emotions in response to the label. However, we did not measure emotional responses to the warning in this study. Additionally, we did not replicate these findings in study 2.2 and the brief alcohol advice did not affect participants' attention to alcohol warning labels. Therefore, any conclusions should be treated with caution.

These studies have some limitations. The viewing task in both studies comprised a 15s viewing period for each beverage container and it was framed as a memory task to ensure that participants would attend to the packaging. The length of exposure and the instructions might have increased attention to areas that participants would normally ignore. Additionally, the alcohol advice manipulation did not increase motivation to reduce drinking, which means that the significant effect of advice condition cannot be interpreted as an effect of motivation to reduce drinking. Previous research showed that the SIPS intervention reduced participants' alcohol consumption at six and twelve months follow-up (Kaner et al., 2013). However, participants in the control condition (who did not receive a brief intervention, but received some feedback about their drinking and a leaflet with information about cutting down on alcohol consumption) also significantly reduced their alcohol consumption during the follow-up period. Participants in these conditions did not significantly differ from each other with regard to reduction in alcohol consumption. This suggests that the SIPS intervention is not more effective than current practises and might not be expected to affect participants'

motivation to reduce drinking. Finally, when viewing multiple products at the same time, people pay more attention to the product they prefer (di Pellegrino et al., 2011). We did not measure brand preferences in these studies, so it is possible that individual differences in brand preferences affected attention allocation to the branding/health warnings. However, we showed each product by itself, so there was no competition for attention between brands. Additionally, everyone had to view each product for exactly 15 seconds, so participants could not decide to view the product for a shorter amount of time if they did not prefer the brand. Therefore, it is unlikely that individual differences in brand preferences had a substantial effect on our results. Our study also had strengths. We used existing alcohol containers with current UK health warnings and used multilevel modelling to control for differences in packaging design. We also used a combination of correlational and experimental designs to investigate the relation between motivation to reduce drinking and attention. Additionally, we allowed participants to manipulate their view of the beverage containers (front/back, zoomed in/out) in any way they liked, which is more similar to real life viewing conditions. However, it should be noted that the manipulation of the containers was not the same as participants handling the container, which would have allowed them to tilt the container in order to better view vertical labels, for example.

To conclude, our studies show that people pay minimal attention to current UK warning labels on alcohol packaging. Motivation to reduce drinking was associated with decreased attention to branding, but not with increased attention to warning labels. Drinking intentions were not affected by attention to warning labels, even when participants had to attend to them. Changes in warning label design that make the label more visually salient and content are advised.

Chapter 3

Attention to novel warning labels on alcohol products and their effect on willingness to pay for alcohol

The studies described in Chapter 2 demonstrated that current UK warning labels attract minimal attention. Even if participants were forced to pay attention to the label, the label did not affect their intentions to drink in the subsequent week. This suggested that the current labels are not effective at reducing drinking behaviour and that warning labels might be more effective if their content was different. This chapter describes three experimental studies that investigated visual attention to novel health warning labels and their effect on drinking intentions and willingness to pay for alcohol. We found that the novel health warning used in these studies (“Every drink of alcohol harms your brain”) did not reduce participants’ intended alcohol consumption in the subsequent week and did not reduce the amount that participants were willing to pay for alcoholic drinks. The novel warning labels also did not capture more attention than the current labels, and individual differences in attention to warning labels did not predict willingness to pay. The implication of these findings is that the warning labels used in these studies are not likely to be an effective alternative to existing UK warning labels.

Contributions: I designed the study, which was approved by Matt Field (primary supervisor). Eric Robinson (second supervisor) gave comments on the conclusions from study 3.1 and approved stimulus materials used in studies 3.2 and 3.3. I collected and analysed the data. Matt Field gave comments on the chapter.

3.1 Abstract

Governments and industry use alcohol warning labels to inform the general public of alcohol-related harms and to reduce drinking. However, the available evidence suggests that warning labels have limited to no effect on drinking behaviour and risk perceptions, which might be accounted for by limited attention to the labels and ineffective label design. Warning labels that communicate health outcomes from alcohol receive considerable public support and have been shown to influence drinking intentions and product choice. However, previous research has not studied attention to these novel health warnings and how they affect willingness to pay for the product that they are printed on. We conducted three experimental studies to test this. Study 3.1 was an online experiment in which participants (N = 284) viewed one of seven warning labels (between-subjects condition; 4 health labels, 2 labels communicating drinking guidelines (including the current UK label), and a control label) before reporting how much they intended to drink in the subsequent week. Study 3.2 was an online experiment in which participants (N = 109) viewed 15 alcohol brands containing one of four labels (health, daily guidelines, weekly guidelines, control; between-subjects condition) before indicating how much they were willing to pay for each individual product. Finally, study 3.3 took place in the laboratory. Participants (N = 30) indicated how much they were willing to pay for the same alcohol brands and labels as in study 3.2 and we measured their eye-movements whilst they viewed the products. However, in this study label condition was manipulated within-subjects, so each brand was shown four times in total. Label condition did not significantly affect drinking intentions or willingness to pay across all studies. In study 3.3, the new warning label did not attract more attention than the current label, and visual attention to the label did not predict willingness to pay on a trial-by-trial basis. This indicates that none of the labels used in these studies would likely result in reduced alcohol consumption.

3.2 Introduction

Alcohol warning labels are widely used to inform the public of alcohol-related harms (International Alliance for Responsible Drinking, 2016) and the majority of the public supports the use of alcohol warning labels to communicate health information (Diepeveen et al., 2013; Maryon-Davis & Jolley, 2010; Thomson, Vandenberg, & Fitzgerald, 2012). However, research shows that alcohol warning labels have a limited effect on behaviour and risk perceptions (see Stockley, 2001; Stockwell, 2006; Claire Wilkinson & Room, 2009 for reviews of the evidence). Researchers suggested that this is due to the design and content of warning labels, as warning labels are typically small and do not provide information on adverse health outcomes (Al-hamdani, 2014; Martin-Moreno et al., 2013). As the studies described in Chapter Two showed, current warning labels on UK alcohol packaging that communicate drinking guidelines attracted minimal attention, and even if participants were forced to look at the label, labels did not prompt participants' intentions to drink less in the subsequent week. This suggests that, in addition to making labels more noticeable, it might be necessary to alter the information on the label in order to affect drinking behaviour.

Many researchers have attempted to design more effective alcohol health warning labels. For example, a warning label that stated that alcohol was a drug increased alcohol risk perceptions among binge drinkers, compared to the standard US warning label (Creyer, Kozup, & Burton, 2002). However, few studies have compared new warning labels to currently implemented labels. Pettigrew et al. (2014) showed that there was considerable support for using cancer warning statements, especially positively framed statements (e.g., reduce your drinking to reduce your risk of cancer), statements about specific types of cancers, and statements that used the phrasing "increases risk of cancer". In a follow-up study, they demonstrated that participants had greater intentions to reduce their alcohol consumption after exposure to the cancer labels compared to before exposure (Pettigrew, Jongenelis, et al., 2016).

Neither of those studies included a control condition, such as currently implemented labels or warning labels with another focus. This is an important limitation, because other researchers demonstrated no significant differences in drinking intentions after exposure to health-related warning labels compared to warning labels that challenged commonly held positive outcome expectancies (Glock & Krolak-Schwerdt, 2013).

Some recent studies demonstrated that health labels may not only reduce drinking intentions, but also influence behaviour, such as drink choice and alcohol consumption. Jarvis and Pettigrew (2013) showed that a negatively framed health warning (“Every drink of alcohol harms your brain”) reduced young adults’ likelihood of choosing products with that label in a forced choice paradigm. Another study showed an effect of warning statements on self-reported alcohol consumption (Armitage & Arden, 2016). In this study, participants were asked to pour a safe amount to drink in one serving out of a wine bottle that contained the standard UK warning label (control condition) or a bottle that contained the warning label in addition to a self-affirming implementation intention (“If I feel threatened or anxious, then I will think about the things that are important to me” – a message that was intended to reduce reactance in response to threatening alcohol warnings (Armitage, Harris, & Arden, 2011; experimental condition). Label condition did not affect how much participants poured, but participants in the experimental condition reported consuming less alcohol at one-month follow-up. However, even though the authors included baseline consumption as a covariate, they did not report a formal repeated measures test to investigate whether alcohol consumption at follow-up differed significantly from baseline between the two conditions.

The aim of the studies reported in this chapter was to investigate how warning labels that provide information about alcohol-related health risks affect drinking intentions (study 3.1) or willingness to pay for alcohol (i.e., product appeal; Studies 3.2 and 3.3) compared to current UK warning labels that communicate guidelines for lower-risk drinking. We

investigated how health labels affected willingness to pay for the alcohol product, compared to labels that communicate drinking guidelines and a control label, in an online study that used a between-subjects design (study 3.2) and a laboratory study that used a within-subjects design (study 3.3). Research suggests that visual attention to warning labels predicted smoking risk perceptions (Süssenbach et al., 2013), and food product choice (Bialkova et al., 2014). Therefore, we also measured visual attention to warning labels in Study 3.3 and investigated how this predicted willingness to pay. We hypothesized that participants would be willing to pay less money for products containing the new health label compared to the other labels (studies 3.2 and 3.3) and that increased visual attention to the health labels (but not the guidelines labels or the control label) would be associated with reduced willingness to pay for alcohol (study 3.3).

Study 3.1 was conducted to inform the design of studies 3.2 and 3.3 and investigated which health label was most effective at communicating alcohol-related health outcomes. To test this, we exposed participants to one of seven labels in an online survey before measuring perceived message credibility, explicit alcohol attitudes, drinking intentions and concern that alcohol poses a threat to health. The label conditions included four health labels (based on Jarvis & Pettigrew, 2013; Pettigrew et al., 2014), the current UK warning label and a control label. Because the Chief Medical Officer recently altered the recommended guidelines for lower-risk consumption from daily guidelines (2-3 units for women, 3-4 units for men) to weekly guidelines (14 units per week for both sexes; Department of Health, 2016), we also included a label that communicated the new guidelines. We hypothesized that effective health labels would reduce participants' intended alcohol consumption in the subsequent week, reduce the extent to which participants report positive alcohol-related attitudes, and increase participants' concern that their alcohol consumption habits pose a threat to their health, compared to drinking guidelines labels or the control label. We also hypothesized that effective

health labels would receive higher credibility ratings than drinking guidelines labels or the control label.

3.2 Study 3.1 (online)

3.2.1 Methods

Participants

Two hundred and eighty-four participants (203 female, 71.5%) completed the online survey. Participants were recruited via online advertisements circulated among students and staff at the University of Liverpool and via participant recruitment websites (such as www.callforparticipants.com and social media pages). Participants had to be 18 years or older to take part, be a UK resident and consume alcohol at least once a month. See Table 3.1 for participant characteristics. The study received ethical approval from the University of Liverpool Research Ethics committee.

Label condition

Participants were exposed to one of seven labels. Each label showed the amount of units in the container, embedded in the outline of a bottle, and a pregnancy warning, see Figure 3.1. Each label contained a different message, see Table 3.2. To make sure that all warnings filled a similar amount of white space on the label, the labels varied in font size, due to differences in the word and character counts of the labels.

Message credibility

Message credibility was measured with three questions: “How believable is this label?”, “How convincing is this label?”, and “How personally relevant is this label?” (Pettigrew et al., 2014). Questions were answered on a 5-point Likert scale (1 = Not at all believable/

convincing/relevant, 5 = very believable/convincing/relevant). Scores on the three scales were averaged into a single measure of message credibility ($\alpha = .79$).

Alcohol-related attitudes

We measured alcohol-related attitudes with four semantic differentials. Participants indicated on a 10-point Likert scale to what extent they considered drinking alcohol to be unpleasant/pleasant, good/bad, boring/fun, and stupid/smart (Glock & Krolak-Schwerdt, 2013; Houben & Wiers, 2007). Scores were averaged into a single measure of alcohol-related attitudes with higher scores indicating more positive attitudes ($\alpha = .71$).

Drinking intentions

To measure drinking intentions, participants were asked how many pints of cider/beer, large glasses of wine, and shots of hard liquor they intended to drink in the next week (Glock & Krolak-Schwerdt, 2013). Their responses were combined into a single measure of intended consumption in UK units.

Health concern

We measured health concern with a single question: How concerned are you that your alcohol drinking habits pose a risk to your health? The question was answered on a 100mm Visual Analogue Scale (VAS) with anchors “Not concerned at all” and “Very concerned”.

Procedure

After giving informed consent, participants filled out some demographic questionnaires (age, gender, country of residence), followed by the AUDIT-Consumption (AUDIT-C, a shortened version of the AUDIT that only uses the first three AUDIT questions; Bush,

Kivlahan, McDonell, Fihn, & Bradley, 1998). The survey was automatically terminated for participants who indicated that they did not live in the United Kingdom and/or never consumed alcohol. Then, participants were randomly assigned to view one of seven labels, followed by measurements of message credibility, alcohol-related attitudes, drinking intentions and health concerns. Finally, they were thanked and debriefed. The survey took no more than 5 minutes and participants were entered into a prize draw to win 1 of 4 £10 Amazon vouchers.

Table 3.1. Participant characteristics for studies 3.1, 3.2, and 3.3.

	Study 3.1 (<i>N</i> = 284)	Study 3.2 (<i>N</i> = 109)	Study 3.3 (<i>N</i> = 30)
Variable	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)
Gender (% female)	71.5%	61.5%	53.3%
Age	26.58 (9.57)	28.56 (10.43)	25.33 (8.41)
AUDIT-C	5.76 (2.34)	6.61 (1.59)	6.77 (2.13)
Contemplation ladder	-	3.30 (3.14)	3.63 (2.92)
Beer frequency (100 mm VAS)	-	58.73 (34.55)	63.00 (33.21)
Beer liking (100 mm VAS)	-	69.34 (34.20)	72.73 (31.02)
Cider frequency (100 mm VAS)	-	37.71 (30.09)	36.17 (30.65)
Cider liking (100 mm VAS)	-	27.91 (33.53)	55.23 (33.49)



Figure 3.1. Label template.

Table 3.2. Study 3.1. Messages used in the seven label conditions. The label conditions “Old guidelines, New guidelines, Health 1, and Recycling” were used in studies 3.2 and 3.3.

Label condition	Label message	Rationale
Old guidelines	<i>UK Chief Medical Officers recommend adults do not regularly exceed; Men: 3-4 units a day; Women: 2-3 units a day</i>	This label communicates UK guidelines that were in effect until January 2016 and were still printed on alcohol containers at the time of testing (Portman Group, 2011)
New guidelines	<i>UK Chief Medical Officers recommend adults do not regularly exceed 14 units a week</i>	This label communicates UK guidelines that were introduced in January 2016 and (at the time of writing) had not yet been printed on alcohol containers (Department of Health, 2016a)
Health 1	<i>Every drink of alcohol harms your brain</i>	This label reduced product selection in previous research (Jarvis & Pettigrew, 2013)
Health 2	<i>Alcohol increases your risk of bowel cancer</i>	This label was evaluated positively by participants and reduced participants intentions to drink (Pettigrew et al., 2014; Pettigrew, Jongenelis, et al., 2016)
Health 3	<i>Alcohol causes cancer: reduce your intake to reduce your risk</i>	This label was evaluated positively by participants (Pettigrew et al., 2014)
Health 4	<i>Reduce your drinking to reduce your risk of cancer</i>	This label was evaluated positively by participants and reduced participants intentions to drink (Pettigrew et al., 2014; Pettigrew, Jongenelis, et al., 2016)
Recycling (control)	<i>Recycle packaging after use</i>	This label would be appropriate on alcohol bottles, as glass bottles are widely recycled in the UK (Recycling Guide, n.d.)

3.2.2 Results

Baseline differences

We conducted two one-way ANOVAs with label condition as the between-subjects factor and age and AUDIT-C scores as the dependent variables, respectively. Results showed that groups did not significantly differ in age ($F(6, 269) = .35, p = .91, \eta_p^2 = .01$), or AUDIT-c scores ($F(6, 277) = .38, p = .89, \eta_p^2 = .01$). A Chi Square test revealed that the gender distribution did not significantly differ between label conditions ($\chi^2(6) = 5.96, p = .43$). Therefore, groups were well-matched.

Label condition

We conducted a one-way MANOVA with label condition as the independent variable and message credibility, alcohol-related attitudes, drinking intentions and health concern as the dependent variables. Results revealed a significant multivariate effect of condition (Multivariate $F(24,926) = 2.73, p < .001$). The effect of condition was only significant for message credibility (Univariate $F(6,268) = 7.44, p < .001, \eta_p^2 = .14$), and not for alcohol-related attitudes (Univariate $F(6,268) = 1.08, p = .37, \eta_p^2 = .02$), drinking intentions (Univariate $F(6,268) = 1.69, p = .12, \eta_p^2 = .04$), and health concern (Univariate $F(6,268) = .77, p = .60, \eta_p^2 = .02$). Post-hoc simple contrasts with the old guidelines label as the reference category showed that all health labels and the recycling label were considered to be significantly less credible than the old guidelines label (all $ps < .01$; see Table 3.3 for means). Only the new guidelines label did not significantly differ from the old guidelines label on credibility ($p = .17$).

Table 3.3. Study 3.1. Effect of label condition on message credibility, alcohol-related attitudes, drinking intentions and health concern.

	Message credibility	Alcohol-related attitudes	Drinking intentions	Health concern
Label condition	M (SD)	M (SD)	M (SD)	M (SD)
Old guidelines (<i>n</i> = 41)	3.54 (1.04)	6.35 (1.67)	9.35 (8.31)	19.73 (23.85)
New guidelines (<i>n</i> = 38)	3.26 (1.06)	6.77 (1.28)	9.92 (8.31)	23.89 (23.21)
Health 1 (<i>n</i> = 43)	2.24 (.88)	6.88 (1.16)	9.34 (7.26)	30.15 (28.59)
Health 2 (<i>n</i> = 41)	2.64 (.89)	6.56 (1.26)	7.59 (6.08)	26.33 (25.87)
Health 3 (<i>n</i> = 42)	2.67 (.96)	6.68 (1.69)	9.78 (9.53)	27.08 (24.05)
Health 4 (<i>n</i> = 36)	2.57 (.94)	6.86 (1.24)	11.94 (10.42)	30.11 (30.43)
Recycling (<i>n</i> = 43)	3.02 (1.34)	6.33 (1.26)	6.62 (5.67)	27.45 (26.71)
Total (N = 284)	2.85 (1.11)	6.63 (1.40)	9.16 (8.28)	26.32 (26.06)

3.2.3 Discussion

The aim of this study was to investigate whether warning labels that communicated alcohol-related health risks had a greater influence on participants' alcohol-related attitudes, intentions to consume alcohol in the next week and concern that alcohol would harm their health than warning labels that communicated low-risk guidelines. We also measured how participants evaluated the labels. Our findings showed that label condition did not significantly affect participants' intentions to consume alcohol in the subsequent week, alcohol-related attitudes or concern that alcohol would risk their health. However, participants' credibility ratings varied significantly between the labels. Overall, participants evaluated the labels as neutral to moderately positive (a score between 2.5 and 3 on a 5-point Likert scale). Participants considered labels that communicated daily guidelines to be more credible than the health-related warnings and the control label. Labels that communicated daily and weekly guidelines received comparable credibility ratings. Similar to the findings by Pettigrew, Jongenelis, et al. (2016) the warning labels used in study 3.1 did not significantly differ from each other in their effect on drinking intentions. Notably, this included the control warning (which had nothing to do with alcohol and was not expected to affect participants' drinking intentions), suggesting that none of the labels affected drinking intentions. As Pettigrew, Jongenelis, et al. (2016) did not use a control label, it is possible that their findings that cancer labels reduced drinking intentions reflected demand effects, as the measures of drinking intentions (pre and post label exposure) were taken in close proximity.

It is possible that methodological choices affected our findings. Firstly, a single exposure to an alcohol-related warning message might not be sufficient to cause changes in participants' intentions to drink. For example, research showed that attitudes towards smoking became more negative with increased exposure to an anti-tobacco print advert (Reinhard, Schindler, Raabe, Stahlberg, & Messner, 2014). However, Armitage and Arden (2016)

demonstrated that a single exposure to warning labels reduced participants' alcohol consumption at a one-month follow-up if it was accompanied by a self-affirming implementation intention. Secondly, we recruited alcohol consumers who consumed alcohol at least once a month, in order to capture a range of drinking behaviours. However, warning labels may have different effects on participants who exceed the government guidelines compared to those who drink within the guidelines. For example, participants who consumed alcohol at least once a week had less favourable opinions about the newly implemented US warning labels than participants who consumed alcohol less than once a week or non-drinkers (Andrews, Netemeyer, & Durvasula, 1991).

Finally, the outcome measures that were used might not have been appropriate to test the potential effectiveness of warning labels. To reduce the duration of this online study, we created a single item to measure participants' concern that their drinking habits might affect their health. However, this item has not been validated, so it is unclear to what extent it reflects participants' alcohol-related health concerns. Additionally, our measure of drinking intentions might not have accurately reflected actual drinking behaviour. The average amount participants across all label conditions intended to consume in the subsequent week was within the UK guidelines (14 UK units per week), but the average AUDIT-C scores across all label conditions indicated that participants on average exceeded the UK guidelines, as the average exceeded the cut-off score for heavy drinking and binge drinking for women (an AUDIT-C score of 4) and approached the cut-off score for men (a score of 6; Aalto, Alho, Halme, & Seppä, 2009). Additionally, in previous research warning labels have been shown to decrease demand for alcohol products in a forced choice paradigm (Jarvis & Pettigrew, 2013). A measure of product demand might be a more appropriate measure of potential label effectiveness than drinking intentions or alcohol-related attitudes. Therefore, we investigated how repeated exposure to warning labels affected demand for alcohol products in studies 3.2 and 3.3.

3.3 Study 3.2 (online)

Results from study 3.1 demonstrated that label condition did not influence participants' drinking intentions, alcohol-related attitudes, and health concerns. Only message credibility was affected by label condition: Participants considered the current UK warning labels more credible than any of the health labels and the control label. Previous literature showed that "*Every drink of alcohol harms your brain*" significantly reduced the likelihood of participants choosing a product with that label (Jarvis & Pettigrew, 2013), whereas the cancer-based health warnings prompted participants to intend to drink less (Pettigrew, Jongenelis, et al., 2016). Based on these results and the existing literature, it was decided to use "*Every drink of alcohol harms your brain*" as the health message in Study 3.2 and 3.3, because there was no evidence that the other health messages that were tested may be more effective at communicating alcohol-related harms.

Because the warning labels in study 3.1 did not influence participants' intentions to drink in the next week, we aimed to investigate the effect of warning labels on demand for alcohol in an online between-subjects experiment. Demand for alcohol is predictive of future alcohol use (MacKillop & Murphy, 2007) and has been used as a measure of drinking intentions in previous research (Gilbert, Murphy, & Dennhardt, 2014). Product demand can be measured using forced choice paradigms, in which participants have to select one product from a range of products with varying characteristics (e.g., Jarvis & Pettigrew, 2013), or by measuring how much participants are willing to pay for the individual products with varying characteristics (e.g., Thunström & Nordström, 2015). A single warning label is currently implemented on alcohol containers in the UK and alcohol consumers are unlikely to encounter a situation where they have to choose between alcohol products with different warning labels. Therefore, we used willingness to pay as a measure of product demand, instead of product choice in a forced choice paradigm. Willingness to pay has been used in previous research to

investigate the effectiveness of product information labels (e.g., nutrition, sustainability) and to measure the effect of implicit reward learning on value perceptions. For example, people were willing to pay more for fibre-enriched products with health claims on the label (Hwang, Lee, & Lin, 2016), for products with a Fair Trade label (Van Loo et al., 2015; Vecchio & Annunziata, 2015), and for geometric shapes that had been associated with high reward in an implicit learning task (Wessel, O'Doherty, Berkebile, Linderman, & Aron, 2014; Wessel, Tonnesen, & Aron, 2015). In this study, we asked participants to indicate how much they would be willing to pay for 15 alcohol brands with one of four warning labels on the packaging (health, old guidelines, new guidelines, recycling). Based on the findings by Jarvis and Pettigrew (2013), we hypothesized that participants who saw products with the health warning would be willing to pay less money for alcohol products than participants who saw products with the old guidelines, new guidelines or recycling label.

3.3.1 Methods

Participants

Two hundred and twenty-seven participants consented to take part in the study. Participants were recruited via online advertisements circulated among students and staff at the University of Liverpool and via participant recruitment websites (such as www.callforparticipants.com and social media pages). To be eligible to take part, participants had to be older than 18, drink more than 14 UK units per week (to capture regular alcohol consumers' who drink in excess of the UK guidelines for lower-risk drinking at the time of testing), and like and regularly consume beer and/or cider (because we used beer and cider brands in this study). One hundred and sixty-three participants met the eligibility criteria. One hundred and twenty-seven participants completed the survey, seven of which failed the attention check, resulting in a final sample of $N = 120$.

Stimuli

We created four warning labels in the same format as Study 3.1: Old guidelines ('UK Chief Medical Officers recommend adults do not regularly exceed; Men: 3-4 units a day; Women: 2-3 units a day'); new guidelines ('UK Chief Medical Officers recommend adults do not regularly exceed 14 units a week'); health ('Every drink of alcohol harms your brain'); and recycling ('Recycle packaging after use').

Then, we photographed 15 bottles of various beer and cider brands with the four warning labels covering the previous warning label (i.e., 60 stimuli in total). To make sure that warning labels were visible, they were made as large as possible: they were allowed to cover the old warning label, the bar code and the correspondence address. However, labels could not cover any brand information. We took four photographs of each bottle, two of the front and two of the back. One front and one back picture depicted the whole bottle (used in study 3.2 and 3.3), whereas different pictures depicted a close-up of the front label or the back label (only used in study 3.3; see Figure 3.2 for examples).

Willingness to pay task

Participants were exposed to the fifteen alcohol brands, each containing the same label on the bottle, dependent on the participants' label condition. Brands were shown separately, in a randomized order. For each brand, participants were shown the full front and full back photo next to each other, followed by a question asking them to indicate how much they were willing to pay for the product if they were to buy it in a supermarket. We asked about willingness to pay in a supermarket specifically, as there is a lot of variation in drink prices in bars and restaurants, whereas the supermarket prices were similar for each photographed brand ($M = £1.77$, $SD = £0.37$; ranging from £1.00 to £2.59 at the time of testing). Additionally, in a real

life setting, labels are most likely to affect purchasing decisions for alcohol bought in off-trade premises (such as a supermarket), than in on-trade premises, as alcohol consumers in the on-trade only receive the product (and therefore only see the label) after they buy their drink. They could choose between 6 monetary amounts between £0.50 and £3.50. The monetary amounts were 6 random numbers between £0.50 -£1.00, £1.00 - £1.50, £1.50 - £2.00, £2.00 - £2.50, £2.50 - £3.00, and £3.00 - £3.50, each randomly generated on a trial by trial basis. The amounts were always displayed in ascending order from left to right. Participants were instructed to select the highest price out of the 6 amounts that they would be willing to pay for the product. We used randomly generated numbers to induce variance in participants' price selections, so that participants did not select exactly the same value every time they saw a brand/label (based on (Wessel et al., 2014).

Procedure

Participants were asked to complete an online survey in a single session. After giving informed consent, participants were randomly allocated to one of four label conditions (between-subjects: Health, New Guidelines, Old Guidelines, and Recycling). Participants were informed that the study investigated how people make decisions about what an appropriate price is for certain products. They were told that they would view several bottles of alcoholic drinks and would be asked to indicate how much they are willing to pay for these bottles, if they were to buy them in a supermarket. Participants were told that some participants would be told what the retail price was of the product and others would not be given that information. In reality, no-one was informed of the retail price of the product. Then, participants completed the willingness to pay task, followed by the AUDIT (Saunders et al., 1993), retrospective alcohol diary (L. C. Sobell & Sobell, 1992), contemplation ladder (LaBrie et al., 2005) and health concern question (100mm VAS). Then, participants indicated how much they liked

beer/cider and how often they consumed beer/cider on 100mm VASs, followed by an open ended question measuring aim awareness, free recall of the label and a manipulation check (multiple choice question on label recognition). Finally, participants were thanked and debriefed. The study lasted approximately 10 minutes and participants were entered in a prize draw to win 1 of 4 £10 Amazon vouchers.

1.

2.

3.

4.



Figure 3.2. Study 3.2 and 3.3. Example of stimuli used during willingness to pay task (study 3.2) and eye-tracking task (study 3.3). We created four photographs of each bottle. 1) Full front; 2) Full back; 3) Front label; 4) Back label.

3.3.2 Results

Exclusion of participants

Visual inspection of response distribution of recent alcohol consumption, AUDIT scores and contemplation ladder scores revealed three extreme outliers in recent alcohol consumption. They were excluded from the analyses. As a measure of attention, we calculated the average time participants spent answering the willingness to pay questions. Visual inspection of the distribution of this variable identified five extreme outliers, who were excluded from analyses because they spent much longer than other participants to answer the willingness to pay questions. Finally, two participants indicated that they had taken part in study 3⁵, so they were also excluded from analyses. This resulted in a final sample of $N = 109$ (Health: $n = 27$; New Guidelines: $n = 28$; Old Guidelines: $n = 25$; Recycling: $n = 29$). See Table 3.1 for participant characteristics. Three participants were aware of the study aims. Exclusion of these participants did not affect the results discussed below.

Baseline differences

A MANOVA with label condition as a between-subjects factor and age, recent alcohol consumption, AUDIT scores, contemplation ladder scores and health concerns as dependent variables revealed no significant multivariate effect of condition ($F(15,279) = 1.15, p = .31, \eta^2_p = .05$). A secondary MANOVA with label condition as a between-subjects factor and beer and cider preferences (liking and consumption frequency) as dependent variables revealed that conditions did not differ on how much they liked beer and cider and how often they consumed beer and cider ($F(12,270) = 1.12, p = .35, \eta^2_p = .04$). A Chi Square test revealed that the gender distribution did not significantly differ between label conditions ($\chi^2(3) = 3.87, p = .28$).

⁵ Studies 3.2 and 3.3 were designed at the same time. For practical reasons, study 3.3 was conducted before study 3.2, as it would have been more time consuming to exclude participants who had taken part in study 3.2 from taking part in study 3.3 than vice versa.

Therefore, groups were well-matched.

Manipulation check

The majority of the participants gave an incorrect answer to the manipulation check question ($n = 59$; 54.1%). A chi squared test indicated significant differences between label conditions in the likelihood of selecting the different answer options ($\chi^2(9) = 5$, $p < .001$), see Table 3.4. Most participants ($n = 70$, 64.2%) reported that they had seen the old guidelines label, even though only 22.9% ($n = 25$) had been exposed to the old guidelines label. Additionally, participants in the novel label conditions (new guidelines, health, recycling) were more likely to select the label they had seen than the two novel labels they had not seen.

Willingness to pay

A one-way ANOVA with label condition as a between-subjects factor and willingness to pay as the dependent variable revealed no significant effect of condition on willingness to pay ($F(3,105) = 1.41$, $p = .25$, $\eta^2_p = .04$).

Opportunity for viewing the labels

Survey meta-data showed that a large minority of participants ($n = 40$, 36.7%) accessed the survey from a smart phone with a screen resolution that was too small to read the labels without zooming in on the photo. We were not able to measure whether participants had zoomed in on the photo in order to read the label. Therefore, we added opportunity for viewing the labels as a between-subjects factor to a one-way ANOVA investigating the effect of label condition on willingness to pay. Results showed no main effect of condition ($F(3,101) = 1.84$, $p = .15$, $\eta^2_p = .05$), opportunity to view labels ($F(1,101) = .003$, $p = .96$, $\eta^2_p < .001$), nor their interaction ($F(3,101) = .90$, $p = .45$, $\eta^2_p = .03$).

Table 3.4. Study 2. Manipulation check. Number of participant in each label condition who reported that they had seen the health label, new guidelines label, old guidelines label or recycling label during the willingness to pay task (multiple choice question).

	Label condition				Total (<i>N</i> = 109)
	Health (<i>n</i> = 27)	New Guidelines (<i>n</i> = 28)	Old Guidelines (<i>n</i> = 25)	Recycling (<i>n</i> = 29)	
Label selection	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)
Health	12 (44.4%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	12 (11.0%)
New Guidelines	1 (3.7%)	7 (25.0%)	2 (8.0%)	1 (3.4%)	11 (10.1%)
Old Guidelines	13 (48.1%)	18 (64.3%)	21 (84.0%)	18 (62.1%)	70 (64.2%)
Recycling	1 (3.7%)	3 (10.7%)	2 (8.0%)	10 (34.5%)	16 (14.7%)

3.3.3 Discussion

In study 3.2, we examined whether repeated exposure to alcohol warning labels that communicate health harms would reduce participants' willingness to pay for alcohol products, compared to warning labels that communicate drinking guidelines. We found no significant differences in participants' willingness to pay for alcohol products containing health warnings, drinking guidelines or a recycling message (control label). Our other findings suggest that this could be due to a lack of attention to the warning labels. The majority of participants reported that they had seen the warning label that is currently displayed on alcohol packaging, even if they had, in fact, been exposed to one of the other three labels. Additionally, a large proportion of participants used a device that was too small to see the warning labels without zooming in. Our sample size was not large enough to be able to exclude participants who did not accurately remember what label they were exposed to.

There are additional limitations to this study. We used a between-subjects design, which means that there could be pre-existing group differences that affected willingness to pay. In this study, the groups did not significantly differ in drinking habits, their liking of beer/cider and how often they consumed beer/cider, so it is unlikely that group differences in drink preferences affected the results. However, there is a potential group difference that we did not measure. For example, participants have a tendency to anchor responses to previous responses to similar questions (Gehlbach & Barge, 2012), but it unclear whether groups differed in the extent to which participants anchored their responses. However, using a between-subjects design also had benefits. It limited the likelihood that participants would guess the aims of the study (less than 3% of participants were aware of the study aims). Additionally, because participants saw each brand only once, it removed the possibility that they would attempt to base the amount they would be willing to pay for each brand on previous answers for the same brand, in order to appear consistent (Falk & Zimmermann, 2013). A within-subjects design

would have the opposite benefits and limitations. It would be more likely that participants in a within-subjects design would guess the study aims (which may affect their behaviour) and base their willingness to pay for a brand on previous answers for the same brand, but any individual differences between label conditions would be removed. Therefore, study 3 used a within-subjects design to examine the effect of warning labels on how much money participants would be willing to pay for alcohol.

3.4 Study 3.3 (laboratory)

In study 3.3, we measured participants' visual attention to warning labels on alcohol packaging and investigated if this was associated with willingness to pay for the product. In Chapter 2, we demonstrated that participants paid minimal attention to current UK warning labels and that attention to the label was not predictive of how much alcohol participants intended to consume in the subsequent week. However, Bialkova et al. (2014) showed that increased attention to the nutrition labels on food products increased the label's influence on subsequent product choice (i.e., fat content of a product had a greater effect on product choice for participants who paid more attention to the label). Similarly, increased attention to sustainability labels on coffee products (e.g., Fair Trade label) was associated with increased willingness to pay for products carrying those labels (Van Loo et al., 2015). Jarvis and Pettigrew (2013) demonstrated that the inclusion of the health warning used in study 3.2 and 3.3 reduced participants' likelihood of choosing the product. We hypothesized that increased attention to the health label would be associated with reduced willingness to pay for the product. Based on our findings in Chapter 2, we also hypothesized that visual attention to the guidelines labels (and the control label) would not be associated with willingness to pay for the product.

3.4.1 Methods

Participants

Thirty participants took part in this study (53.3% female). Participants were recruited via online advertisements circulated among students and staff at the University of Liverpool. To be eligible to take part, participants had to be older than 18, drink more than 14 UK units per week (to capture regular alcohol consumers' who drink in excess of the UK guidelines for lower-risk drinking at the time of testing), and like and regularly consume beer and/or cider (because we used beer and cider brands in this study). See Table 3.1 for participant characteristics. The study received ethical approval from the University of Liverpool ethics committee.

Eye-tracking task

Participants were asked to view images of 60 bottles of beer/cider with the four warning labels and indicate their willingness to pay for the product. Each trial consisted of two stages: a viewing stage, immediately followed by the willingness to pay stage. The images were displayed in a quasi-random order (brands could not be displayed twice in a row, maximally two repetitions of the same label in a row). All participants saw the images in the same order. We used the same cover story as in study 3.2. Additionally, participants were told that because of the "price manipulation", they might see some brands multiple times and they were asked to treat each trial as if it was the first trial they had seen. Before starting the eye-tracking task, participants received an example of the viewing stage and the willingness to pay stage.

Viewing stage (based on methods described in Chapter 2)

Participants were asked to view each bottle for 15s. They were instructed to use the arrow keys to manipulate the display of the containers. The left and right arrow keys were used to alternate between front and back. The up arrow was used to zoom in on the label and the

down arrow was used to zoom out. Participants were free to manipulate the presentation of the container in any way they liked. Whether the ‘zoomed out’ front or back of the container was presented first was randomized on a trial-by-trial basis. To ensure that all participants had the same starting position at image onset, participants were instructed to look at a fixation cross that was presented for 1s before the trial started. Participants’ eye movements were measured using an ASL Eye-Trac D6 (Applied Science Laboratories, Bedford, MA) at a sampling rate of 120 Hz.

Willingness to pay stage

Immediately after the viewing stage, we showed participants an image of the ‘zoomed out’ front and back of the product they had just viewed. They were asked to indicate how much they were willing to pay for this product. As in Study 3.2, response options were randomly generated prices in ascending price brackets.

Procedure

After providing informed consent, participants completed the eye-tracking task, followed by a questionnaire battery measuring recent alcohol consumption (a 14-day retrospective diary based on Sobell & Sobell, 1992), hazardous drinking (AUDIT; Saunders et al., 1993), and motivation to reduce drinking (TRI; R. Lorraine Collins & Lapp, 1992; RTCQ; Rollnick et al., 1992; contemplation ladder; LaBrie et al., 2005). Then, participants indicated how much they liked beer/cider and how often they consumed beer/cider on 100mm VASs (in order to investigate whether participants in studies 3.2 and 3.3 were comparable). Then, we asked participants what they thought the aims of the study were (open-ended question), followed by a brand recognition task, in which participants had to indicate on a list with 30 beer and cider brands (15 (half) of those that had been presented during the study, and an additional 15 novel brands) which ones they had seen during the study. To measure label recall,

we told participants that they had seen four labels during the eye-tracking task and asked them to write down what message was displayed on each label (open-ended question). Participants were shown a blank label (Figure 3.1) to aid recall. Finally, we measured what strategies participants used to answer the willingness to pay questions during the eye-tracking task (multiple choice question), before they were thanked and debriefed. The study lasted approximately 40 minutes and participants received a £5 high street voucher as compensation for their time.

Data preparation and analysis

We used a repeated-measures MANOVA to investigate the effect of label condition on visual attention to the labels (gaze time in seconds) and willingness to pay for the product (in pounds sterling), followed by planned post-hoc t-tests for significant univariate tests. It is likely that participants' willingness to pay depends on the specific brand and that the amount of attention they pay to warning labels depends on the visual characteristics of the rest of the bottle. If this is the case, willingness to pay and attention to warning labels would be more similar when comparing the label conditions within the same brand than across different brands. Therefore, we used multilevel modelling to investigate the effect of label condition on willingness to pay and attention to the label, while taking differences between brands and similarities within brands into account. Additionally, we used multilevel modelling to investigate to what extent visual attention to the warning labels was predictive of willingness to pay on a trial-by-trial basis. Data were organised in three levels, with label condition (Old Guidelines, New Guidelines, Health, Recycling) nested in brands (15 containers; level 2) nested in data from each individual participant (level 3). To eliminate noise due to inaccurate eye-tracking, trials in which participant spent less than 50% of the viewing time looking at the product (the only stimulus on the screen) were excluded from all analyses concerning visual

attention (14%). The multilevel models included random intercepts for all three levels.

3.4.2 Results

Effect of label condition on attention and willingness to pay

We conducted a one-way repeated measures MANOVA with label condition as the within-subjects factor and attention to the warning labels and willingness to pay as the dependent variables. The multivariate test revealed a significant effect of label condition ($F(6,22) = 2.82, p = .03, \eta^2_p = .44$). Inspection of the univariate tests revealed that both the effect of condition on attention ($F(2.65,71.50) = 4.57, p = .008, \eta^2_p = .15$) and the effect of condition on willingness to pay ($F(2.49,67.21) = 2.92, p = .05, \eta^2_p = .10$) were statistically significant.

Attention (Figure 3.3)

Over a 15s viewing period, participants looked at alcohol warning labels for 1.95s (SD = 0.87, 13%) averaged across all conditions. Post-hoc t-tests revealed that participants spent significantly less time looking at the Recycling labels (M = 1.74, SD = .81) than at the labels communicating the Old Guidelines (M = 2.06, SD = .93, $t(27) = 3.78, p = .001, d = .71$) or the New Guidelines (M = 2.10, SD = 1.13, $t(27) = 3.11, p = .004, d = .59$). The comparison between Recycling labels and Health labels was not significant (M = 1.87, SD = .85, $t(27) = 1.31, p = .20, d = .25$). The comparison between attention to the New Guidelines and Health labels, $t(27) = 1.83, p = .08, d = .35$, Old Guidelines and Health labels, $t(27) = 1.56, p = .13, d = .30$, and the comparisons between attention to the Old Guidelines and the New Guidelines, $t(27) = .38, p = .71, d = .07$, were not significant.

A multilevel model (level 3: participant; level 2: brand; level 1: label) using label condition (dummy coded with Old Guidelines as the reference category) to predict attention was a significant improvement on the intercept only model ($\chi^2(3) = 9.70, p = .02$, see Table

3.5). Inspection of the individual predictors showed that participants paid significantly less attention to the Recycling labels ($B = -.32$, $SE = .14$, $z = 2.29$, $p = .02$) compared to the other label conditions. Attention to Health ($B = -.21$, $SE = .14$, $z = 1.5$, $p = .14$), or New Guidelines labels ($B = .07$, $SE = .62$, $z = .5$, $p = .62$) did not significantly differ from the other conditions. *Willingness to pay (Figure 3.4)*

Post-hoc t-tests revealed that participants were willing to pay more money for products with the Old Guidelines label ($M = 1.89$, $SD = .35$) than products with the Health label ($M = 1.83$, $SD = .34$, $t(29) = 2.37$, $p = .03$, $d = .43$), New Guidelines label ($M = 1.86$, $SD = .36$, $t(29) = 1.84$, $p = .08$, $d = .34$), or Recycling label ($M = 1.85$, $SD = .34$, $t(29) = 1.95$, $p = .06$, $d = .36$), but only the comparison with the health label was statistically significant. The comparisons between the Health label and the New Guidelines label, $t(29) = 1.15$, $p = .26$, $d = .21$, between the Health label and the Recycling label, $t(29) = .86$, $p = .40$, $d = .16$, and between the New Guidelines label and the Recycling label, $t(29) = .08$, $p = .93$, $d = .02$, were not significant⁶.

A multilevel model (level 3: participant; level 2: brand; level 1: label) using label condition (dummy coded with Old Guidelines as the reference category) to predict willingness to pay was not a significant improvement on the intercept only model ($\chi^2(3) = 3.85$, $p = .29$; see Table 3.5).

Attention to labels as a predictor of willingness to pay

We analysed how attention to the labels predicted willingness to pay on a trial-by-trial basis using multilevel modelling. The data was organised in 3 levels: Labels (level 1) nested within brands (level 2) nested within participants (level 3). A multilevel regression model with attention, label condition and their interaction as predictors of willingness to pay was not a

⁶ To ensure that the differences in willingness to pay were not caused by the random number generator that generated the price options, we repeated the post-hoc t-tests with willingness to pay indicated by the response option (i.e., 1 – 6). This revealed the same pattern of results.

significant improvement compared to an intercept-only model ($\chi^2(7) = 10.45, p = .16$; see Table 3.6).

Attention to labels as a predictor of message recall

Each participant was asked to write down which four messages were displayed on the warning labels during the eye-tracking task. Responses were coded to quantify whether or not participants correctly recalled each warning label. A response was coded as “correct [label] recall” if it was possible to infer which label the participant referred to. For example, “male 3-4 units, female 2-3 units” would be coded as correct recall of the old guidelines label, and “max 14 units per week” would be coded as correct recall of the new guidelines label. Twenty-four participants (80%) correctly recalled at least one label, see table 3.7. Participants were most likely to recall the health label, followed by the old and new guidelines labels and the recycling label. We conducted 4 stepwise binary logistic regression analyses to explore whether attention to any of the labels predicted label message recall. Results showed that attention to any of the labels did not predict Old Guidelines recall, see Table 3.8. The only significant predictor of New Guidelines recall was visual attention to the New Guidelines label (odds ratio = 8.16, $p = .01$, 95% CI [1.61, 41.32]). The only significant predictor of Health label recall was visual attention to the Health label (odds ratio = 6.71, $p = .02$, 95% CI [1.29, 34.97]). The only significant predictor of Recycling label recall was visual attention to the Health label (odds ratio = 16.46, $p = .01$, 95% CI [2.02, 133.97]).

Awareness of aims

Five participants (16.7%) were aware of the study aims. To test how robust our main findings were, we repeated the one-way repeated measure MANOVA with label condition as the within-subjects factor and attention and willingness to pay as the dependent variables without the aware participants. The multivariate test revealed a non-significant effect of label

condition ($F(6,18) = 2.73, p = .11, \eta^2_p = .41$). Inspection of the univariate tests, revealed that the effect of condition on attention ($F(2.51,57.80) = 2.21, p = .11, \eta^2_p = .09$) and the effect of condition on willingness to pay ($F(2.45,56.23) = 2.18, p = .11, \eta^2_p = .09$) were non-significant. Post-hoc t-tests showed that the pattern of results was similar to the results obtained with the full sample.

Answer strategy

Eighteen participants (60%) reported complying with the instructions for answering the willingness to pay questions during the eye-tracker task (i.e., disregarding previous answers), six of which were confident they had succeeded in doing so, whereas eleven did not think they were successful. Of the other strategy options identified by participants, trying to remember the price of the brand in the supermarket ($n = 12; 40\%$), basing their answers on their general willingness to pay for alcohol ($n = 12; 40\%$), and selecting the same price as in earlier trials with the same brand ($n = 11; 36.7\%$) were selected most frequently (see Table 3.9 for all strategy options participants could select).

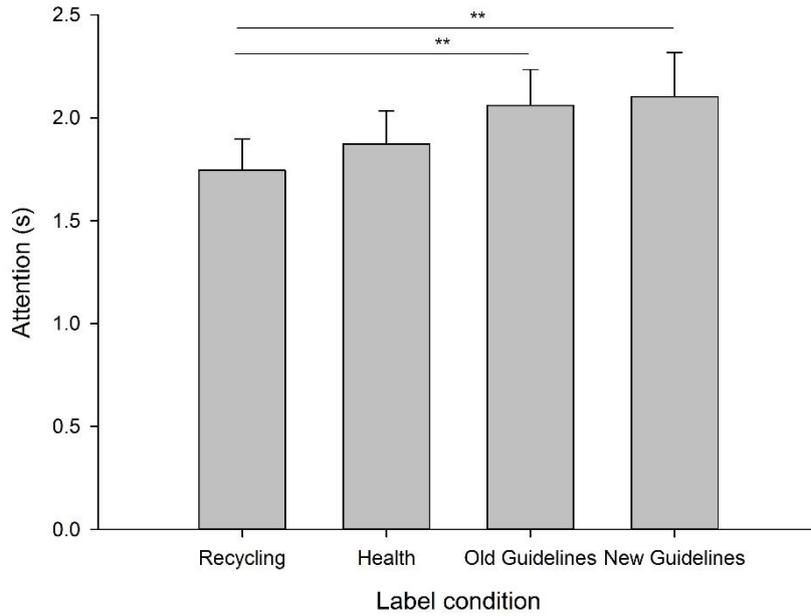


Figure 3.3. Study 3.3. Visual attention (gaze time in seconds) to warning labels for each label condition. Bars represent attention averaged across all trials, error bars represent SEM. Double asterisks indicate significant contrasts at $p < .01$.

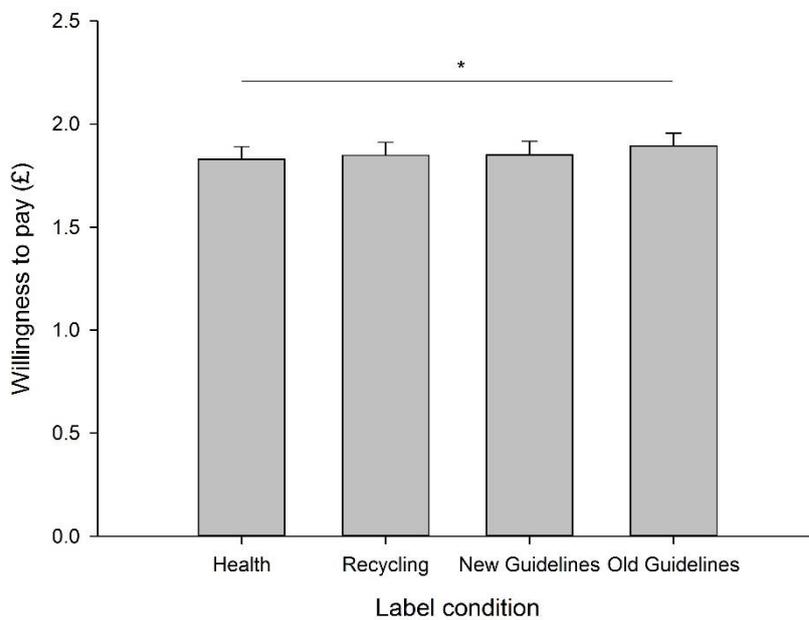


Figure 3.4. Study 3.3. Willingness to pay for alcohol products (in Pound Sterling) in each label condition. Bars represent attention averaged across all trials, error bars represent SEM. Single asterisk indicates significant contrasts at $p < .05$.

Table 3.5. Study 3.3. Multilevel regression model investigating visual attention to warning labels and willingness to pay for alcohol across different warning label conditions (Old Guidelines (reference), New Guidelines, Health, Recycling).

Variable	Visual attention <i>b</i> (SE)	Willingness to pay <i>b</i> (SE)
Intercept	2.12 (0.10)	1.89 (0.06)
Label condition		
Health	-0.21 (0.14)	-0.06 (0.03) ⁺
New Guidelines	0.07 (0.14)	-0.04 (0.03)
Recycling	-0.32 (0.14)*	-0.04 (0.03)
Old Guidelines (reference)	-	-
Residual variance level 3 / proportion explained	3.74 (0.14) / 0.64%	0.11 (0.03) / 0.0%
Residual variance level 2 / proportion explained	0 (0) / -	0.22 (0.01) / 0.45%
Residual variance level 1 / proportion explained	0 (0) / -	0 (0) / -
$\chi^2(3)$	9.70*	3.85

Note: ⁺ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Table 3.6. Study 3.3. Multilevel regression model investigating how visual attention to warning labels affected willingness to pay for alcohol across different label conditions (Old Guidelines (reference), New Guidelines, Health, Recycling).

Variable	Willingness to pay <i>b</i> (SE)
Intercept	1.90 (0.04)
Label condition (Reference: Old Guidelines)	
Health	0.02 (0.06)
New Guidelines	-0.01 (0.06)
Recycling	-0.05 (0.06)
Visual attention to label (<i>s</i>)	-0.004 (0.02)
Visual attention × Health label	-0.04 (0.02) ⁺
Visual attention × New Guidelines label	-0.01 (0.02)
Visual attention × Recycling label	0.003 (0.02)
Residual variance level 3 / proportion explained	0.34 (0.01) / 0.89%
Residual variance level 2 / proportion explained	0 (0) / -
Residual variance level 1 / proportion explained	0 (0) / -
$\chi^2(7)$	10.45

Note: ⁺ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Table 3.7. Study 3.3. Participant recall of warning labels in a free recall task.

	Old guidelines	New guidelines	Health	Recycling
Participant subgroup	<i>n</i> (% of subgroup)			
All participants (<i>N</i> = 30)	15 (50.0%)	13 (43.3%)	22 (73.3%)	11 (36.7%)
Participants who correctly recalled 1 label (<i>n</i> = 3)	1 (33.3%)	0 (0.0%)	2 (66.7%)	0 (0.0%)
Participants who correctly recalled 2 labels (<i>n</i> = 9)	5 (55.6%)	3 (33.3%)	8 (88.9%)	2 (22.2%)
Participants who correctly recalled 3 labels (<i>n</i> = 8)	5 (62.5%)	6 (75.0%)	8 (100%)	5 (62.5%)
Participants who correctly recalled all labels (<i>n</i> = 4)	4 (100%)	4 (100%)	4 (100%)	4 (100%)

Table 3.8. Study 3.3. Stepwise regression analyses with attention to the four label conditions (Old Guidelines, New Guidelines, Health, Recycling) predicted label message recall.

Variable	Label recall			
	Old Guidelines	New Guidelines	Health	Recycling
Attention to Old Guidelines label (Odds ratio)	-	-	-	-
Attention to New Guidelines label (Odds ratio)	-	8.16*	-	-
Attention to Health label (Odds ratio)	-	-	6.71*	16.46**
Attention to Recycling label (Odds ratio)	-	-	-	-
R ²	N/A	.47	.23	.32
$\chi^2(1)$	N/A	14.38***	8.02**	15.09***
Excluded Variables				
Attention to Old Guidelines label (Wald's test score)	.22	2.00	1.30	.74
Attention to New Guidelines label (Wald's test score)	.80	-	.57	.80
Attention to Health label (Wald's test score)	.55	.003	-	-
Attention to Recycling label (Wald's test score)	.001	.47	.13	2.04

Note: ⁺ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Table 3.9. Study 3.3. Strategies used to answer willingness to pay questions during the eye-tracking task. Participants were asked to select all strategy options that applied.

Strategy option	<i>n</i> (%)
I tried to remember what I paid for the brand in an earlier trial and chose the same price	11 (36.7%)
I tried to remember how much the brand costs in the supermarket and chose the same price	12 (40%)
I tried to remember what I paid for the warning label in an earlier trial and chose the same price	3 (10.0%)
I based my answer on what I'm generally willing to pay for alcohol and not on the product itself	12 (40.0%)
I always chose the same option (for example, option no 3) and didn't look very closely at the price of the options	3 (10.0%)
I tried to forget my previous answers and answer only based on the current product and I think I managed to do this	6 (20.0%)
I tried to forget my previous answers and answer only based on the current product, but I didn't manage to do that	11 (36.7%)
Other strategy	4 (13.3%)

3.5 General Discussion

The studies reported here investigated whether health labels would reduce participants' intended alcohol consumption in the subsequent week and reduce demand for alcohol, compared to current labels communicating drinking guidelines. We found no evidence that label condition affected drinking intentions (study 3.1) and some evidence that participants were willing to pay more money for alcohol products that contained the current warning label, but this was not robust (studies 3.2 and 3.3). Our results also showed that participants did not pay more (or less) attention to health labels than existing labels, and individual differences in attention to any of the labels did not predict willingness to pay for alcohol on a trial-by-trial basis. However, individual differences in visual attention to the labels significantly predicted label recall for the weekly guidelines label and the health label.

Our results did not support the hypothesis that the novel health warning label used in this study would result in reduced demand for alcohol. Our hypothesis was based on findings by Jarvis and Pettigrew (2013) who showed that the health warning "Every drink of alcohol harms your brain" reduced product choice for alcohol products that contained this warning text. Our results indicate that this does not translate to reduced willingness to pay for the product. Even though study 3.3 showed that participants were willing to pay significantly less money on average (a mean difference of £0.06) for products containing health labels compared to the current labels communicating drinking guidelines, these findings were not reflected in multilevel analysis and were not consistent with findings from study 3.2. A possible explanation is that participants in these studies did not rely on the label information to estimate how much they would be willing to pay for the product. This explanation is supported by our finding that visual attention to the labels did not predict willingness to pay. Van Loo et al. (2015) demonstrated that sustainability labels only increased willingness to pay among

participants who were concerned about sustainability in the food sector. Additionally, they showed that visual attention to the sustainability labels was only associated with increased willingness to pay for the product among those participants who considered food sustainability to be important. It is possible that health labels would only predict willingness to pay for alcohol among people who consider their health to be important.

Willingness to pay for alcohol may also be influenced by factors other than labelling, such as taste or perceived quality. Thunström and Nordström (2015) demonstrated that taste was a more important influence on willingness to pay for snack products than health labelling. Similarly, Costanigro, Appleby, and Menke (2014) found that wine quality had a greater influence on willingness to pay for wine than the inclusion of a label that stated that the wine did not contain added sulphites, even among participants who believed that sulphites caused headaches. Therefore, it is possible that participants' brand preferences influenced their willingness to pay for alcohol, and this might have overshadowed any influence of warning labels.

We also investigated visual attention to warning labels, specifically whether label content affected attention allocation and if this predicted willingness to pay and message recall. Participants spent 13% of total viewing time attending to the warning labels. This is almost twice as much as in the studies described in Chapter 2. This increase in attention likely reflects the increase in label size as labels in the current studies did not only cover up the current label, but also correspondence information and the bar code. Comparisons between label conditions revealed a robust significant difference between the recycling label and the two drinking guidelines labels: Participants paid less attention to the recycling label than the guidelines labels. These findings are unexpected, as unfamiliar stimuli are known to attract more attention than familiar stimuli (such as the current warning labels; Nunnally, Lemond, & Wilson, 1977). However, the novel labels all contained fewer words and were in a larger font size than the

current warnings. Therefore, a reduction in reading difficulty might have reduced attention (Rayner, 2009). Attention did not predict willingness to pay for the product, but it did predict message recall. Increased attention to the new guidelines label predicted increased odds of recalling that specific label. Increased attention to the health label predicted increased odds of recalling both the health label and the recycling label. This is in line with findings by Thomsen and Fulton (2007) who showed that individual differences in attention to responsible drinking statements in alcohol print adverts were associated with increased message recall. Recall of the old guidelines label (currently used on alcohol packaging) was not predicted by individual differences in allocation of attention to that label. This might reflect participants' awareness of the current UK warning label message. Indeed, in study 3.2, 64% of participants selected the label in the manipulation check, even if they in fact did not see that label during the study at all, and in study 3.3, 50% of the participants were able to recall it during a free recall task. These findings suggest that participants in study 3.2 did not pay much attention to any of the warning labels. It is possible that participants assumed that the alcohol products all contained the existing warning labels and that, therefore, they did not need to pay attention to them, because participants already knew what information was displayed on existing warning labels.

The current studies had some limitations. Firstly, study 3.3 indicated that participants used various strategies to answer the willingness to pay questions and did not adhere to the instructions. Many participants reported that they tried to remember the product's retail price and responded with a similar price. It is likely that participants in study 3.2 used similar response strategies, which could have obscured the effect of warning labels on willingness to pay. Secondly, the majority of participants in study 3.2 were not able to correctly identify what label they saw during the study. This indicates that participants generally did not pay attention to the labels and suggests that they might not consider warning labels to be important information for purchasing decisions. Thirdly, we used a hypothetical measure of willingness

to pay. Research has shown that hypothetical measures of willingness to pay overestimate participants' actual willingness to pay (Pinto & Botelho, 2002; Voelckner, 2006). However, the resulting demand curves (i.e., an equation that reflects the likelihood that people are willing to buy a product at increasing price points) are an accurate approximation of demand curves calculated from actual purchasing data (K. M. Miller, Hofstetter, Krohmer, & Zhang, 2011). In this study, we were interested in willingness to pay relative to the label conditions and we did not aim to gather economically accurate estimates of willingness to pay. Therefore, hypothetical willingness to pay was probably an appropriate measure in this study. However, in a recent study, Roberto, Wong, Musicus, and Hammond (2016) demonstrated that warning labels about sugar-sweetened beverages affected parents' likelihood of selecting a sugar-sweetened beverage for their child, but did not affect how much parents' were willing to pay for the beverages. This suggests that willingness to pay might not be a reliable predictor of prospective behaviour. Finally, we conducted studies 3.1 and 3.2 online, instead of in the laboratory. Internet research is associated with a lack of experimental control (e.g., environment, time of day, distractions), which could introduce confounds (Reips, 2002). However, a study that compared an online survey to laboratory testing showed that they had equivalent results (Casler, Bickel, & Hackett, 2013). Indeed, our findings were also consistent across the online surveys and the laboratory experiment.

Our studies also had strengths, we used a control label that was not related to alcohol and compared health labels with labels that communicated the old UK drinking guidelines (which are on current labels) and the new drinking guidelines (which have not yet been implemented on labels). Additionally, we used a within-subjects and between-subjects design to investigate the effect of health labels on willingness to pay, which provided important information about the robustness of the effect. We also used a cover story to minimize demand effects. The low proportion of participants who guessed study aims indicates that this was done

successfully. Lastly, we used willingness to pay as the outcome measure, instead of product choice. If a warning label were to be implemented it is likely that it would be printed on all product labels. This means that in real life participants would not experience a “forced choice” between brands with different labels. So, prior to implementing any novel label it is important to investigate if the label only affects product appeal compared to other labels, and also if the label in question is the only label that is printed on alcohol products.

To conclude, our results showed that novel health warnings were not more effective than drinking guidelines labels at reducing how much people were intending to drink in the subsequent week or how much they were willing to pay for alcohol. Drinking guidelines labels attracted more attention than the control label, but attention seemed proportional to readability and the amount of words in each label. Individual differences in attention did not predict willingness to pay. Even though the label “Every drink of alcohol harms your brain” reduced product choice in previous research, our results demonstrated that this did not translate to reduced willingness to pay. Therefore, implementation of this label is unlikely to reduce alcohol consumption. Future research should investigate what characteristics of warning message(s) might reduce willingness to pay for the product in addition to reduce product choice compared to existing labels.

Chapter 4

A laboratory investigation of the effect of alcohol advertising on beverage choice and sipping behaviour: are effects generalised or brand-specific?

This chapter describes an experimental study that investigated whether alcohol advertising affects immediate alcohol consumption in a brand-specific or generalised manner. To test this, I exposed pairs of participants to alcohol adverts or control adverts in a semi-naturalistic environment and measured which drink participants chose and whether they were more likely to sip in close proximity to seeing the adverts. Results show that advertising condition did not have a brand-specific, nor general effect on drink choice or sipping behaviour. However, many participants chose their drinks before they saw the adverts, which reduced the sample size and limited the validity of the current findings.

Contributions: I designed the study, which was approved by Matt Field (primary supervisor). Eric Robinson (second supervisor) and Emma Boyland (third supervisor) gave feedback on the study design. I collected and analysed the data. Matt Field and Eric Robinson (second supervisor) gave comments on the chapter.

4.1 Abstract

Long term exposure to alcohol advertising predicts onset of drinking and increased levels of alcohol consumption. A meta-analysis also revealed a small effect of alcohol advertising on the volume of alcohol consumed in the laboratory. Recent cross-sectional research showed that, in addition to the established general effect of alcohol advertising, alcohol advertising increased brand-specific consumption among underage drinkers, but it is unclear how this translates to alcohol consumption shortly after exposure to the advert. The current study aimed to investigate whether alcohol advertisements have a general effect or brand-specific effect on drink choice and sipping behaviour in the laboratory. To test this, we asked 64 pairs of friends to watch a television programme in a living room environment. The TV programme was interrupted by 4 advert breaks. In each break they saw one of four target ads, which was manipulated on a between-subjects basis (one of two alcohol brands, one soft drink brand, or one control brand) among two neutral ads. The target ad was the same in each break, but the neutral ads differed. Whilst watching TV, they could help themselves to some alcoholic or non-alcoholic drinks from a fridge in the room. Drink choice and sipping behaviour in relation to the ad breaks were the dependent variables. Multilevel modelling was used to account for clustering in the data. Results show that advertising condition did not have a brand-specific, nor general effect on drink choice or sipping behaviour. We also analysed peer influence on alcohol consumption and found a brand-specific mimicry of drink choice and sipping behaviour within pairs of participants. Our findings contradict previous research that showed that alcohol advertising had a positive, albeit small, effect on alcohol consumption in the laboratory. Limitation and directions for future research will be discussed.

4.2 Introduction

Alcohol is widely marketed in the UK: In 2010, more than a third of advertising breaks depicted alcohol at least once (Lyons, McNeill, & Britton, 2014), and 77% of Scottish adolescents reported that they had seen alcohol advertising on television or in the cinema (Gordon et al., 2010). Cumulative exposure to alcohol advertisements predicts onset of drinking and increased levels of alcohol consumption among adolescents (Anderson, de Bruijn, et al., 2009). Underage drinkers' brand preferences are correlated to marketing expenditure: Teenagers prefer brands that spend more money on advertising over those with a smaller advertising budget (Tanski, McClure, Jernigan, & Sargent, 2011). Adolescents who had a favourite brand drank more frequently, drank more alcohol per drinking occasion (Lin, Caswell, You, & Huckle, 2012), and were more likely to be binge drinkers than those who had no favourite brand (Tanski et al., 2011). In addition to the general effect of alcohol advertisements on alcohol consumption (Anderson, de Bruijn, et al., 2009), a recent study demonstrated a brand-specific dose-response relationship between alcohol advertisements and alcohol consumption. Increased exposure to branded alcohol advertising on television was associated with an increased likelihood of underage drinkers consuming those advertised brands in particular and with an increase in brand-specific alcohol consumption (Ross et al., 2014).

Besides a cumulative effect, alcohol advertising has an immediate effect on alcohol consumption as well. A recent meta-analysis found that alcohol advertising (compared to non-alcohol advertising) led to a small increase in the volume of alcohol consumed in the laboratory (Stautz et al., 2016). This meta-analysis compiled the results from seven studies that experimentally tested the acute effect of alcohol advertisements on consumption. Even though one of these studies included the advertised alcohol brands as drinks options for participants to consume (Kohn & Smart, 1984), none of them compared the consumption of advertised brands

with non-advertised brands. Hence, it is clear that alcohol advertising has a generalised effect on immediate consumption of alcoholic drinks in general (i.e. not only the brands that were advertised), but it is unknown whether alcohol advertising has a particularly marked effect on immediate consumption of the brand that was advertised. The current study aims to investigate whether alcohol advertisements have a general effect or brand-specific effect on ad-lib alcohol consumption.

Another aim of this study is to investigate a potential mechanism of action in the immediate effects of alcohol advertising. One study observed participants' sipping behaviour and found that participants were more likely to sip alcohol shortly after an actor took a sip of alcohol (Koordeman, Kuntsche, Anschutz, van Baaren, & Engels, 2011), which accounted for the overall increase in immediate alcohol consumption compared to participants who watched a film with all alcohol portrayal removed (Koordeman, Anschutz, van Baaren, & Engels, 2011). However, depictions of actors sipping are likely to be confounded by the presence of alcohol cues, and the authors did not compare sipping behaviour in response to actors sipping to sipping behaviour in response to alcohol cues in general. It is therefore possible that people are more likely to drink alcohol shortly after they are exposed to any alcohol cues, which could account for the increase in ad-lib alcohol consumption after exposure to alcohol advertising. This study aims to investigate whether participants are more likely to sip alcohol shortly after seeing alcohol advertisements.

Another factor that is important to consider is the effect of drinking companions on alcohol consumption. People commonly consume alcohol in a social context (83.4% of drinking occasions take place with one or more drinking companions; Ally, Lovatt, Meier, Brennan, & Holmes, 2016) and research shows that drinking partners have considerable influence on each other's alcohol consumption. For example, participants consume more alcohol when they are drinking with someone else who drinks alcohol than when their drinking

partner consumes soda. (Dallas et al., 2014; Larsen et al., 2012). This effect has been found regardless of whether participants were drinking in a same-sex or mixed-sex dyad (Larsen, Overbeek, et al., 2010). Participants also mimicked their drinking partner's sipping behaviour: Participants were more likely to take a sip of their drink shortly after their drinking partner took a sip (Larsen, Engels, Souren, Granic, & Overbeek, 2010). This effect was most pronounced when both drinking partners were drinking the same type of drink (i.e., alcohol or soda), compared to when one consumed alcohol and the other consumed soda. Considering that almost all previous studies investigating the effect of alcohol advertising on ad-lib alcohol consumption did so in a social drinking setting (i.e., with two or more participants taking part in the study at the same time; Engels, Hermans, van Baaren, Hollenstein, & Bot, 2009; Kohn & Smart, 1984, 1987; Koordeman et al., 2012; Koordeman, Anschutz, & Engels, 2011; Wilks et al., 1992) it is important to take drinking partners' influence on alcohol consumption into account when analysing the immediate effect of alcohol advertising. However, only Engels et al. (2009) and Koordeman et al. (2012) statistically controlled for clustering in drinking dyads. Indeed, the meta-analysis by Stautz et al. (2016) did not control for data clustering either. This is important, as ignoring data clustering when it is present can inflate effect sizes (Julian, 2001). Considering the small effect size found in the meta-analysis, one wonders whether the effect would be non-significant once clustering is controlled for. This study aimed to investigate whether alcohol advertising affects drink choice and sipping behaviour above and beyond social mimicry effects.

To test this, we asked pairs of friends to watch a television programme with advert breaks. In these advertisement breaks they saw advertisements for either *Bulmers*, *Magners*, *Pepsi*, or a control brand. Whilst they watched TV, they were able help themselves to some alcoholic (*Bulmers*, *Magners*) or non-alcoholic drinks (*Pepsi* and *Dr Pepper*). Choice of drink and sipping behaviour were measured as the dependent variables of this study. If the effect of

alcohol advertising is brand-specific, general drink choice (i.e., alcohol or soda) should be similar for participants who are exposed to alcohol advertising or control advertising, but there should be significant differences in the amount of times each specific brand of alcohol is chosen and sipped when we compare exposure to advertising of different alcohol brands. A general effect of alcohol advertising would manifest itself in a significant difference in alcohol drink choice between alcohol and control advertising, but no association between the brand of alcohol advertised and the brand consumed. We would expect similar effects with regard to sipping behaviour: A general effect of alcohol advertising on sipping behaviour would result in participants being more likely to take a sip during sensitive periods (shortly after seeing the advert) than during non-sensitive periods (any time that the advert is not displayed), but only if they drank the advertised beverage type (alcohol or soda), whereas a brand-specific effect would be contingent on whether participants drank the advertised brand.

4.3 Methods

Participants

One hundred and twenty-eight participants (93 F; age $M = 21.10$, $SD = 4.47$) were recruited in pairs. This sample size resulted from a power calculation to detect a medium to large effect with 80% power (Cohen's $f = 0.30$, $\alpha = .05$), based on previous studies with a similar methodology (Engels et al., 2009; Koordeman et al., 2012). Participants were recruited via online advertisements circulated among students and staff at the University of Liverpool. To be eligible for participation, participants had to be older than 18 years and fluent in English. To capture alcohol consumers who drank regularly, participants had to be social drinkers (at least 10 UK units/week). For an overview of participant characteristics, see Table 4.1. The study received ethical approval from the University of Liverpool Research Ethics Committee.

Design

The study utilised a between-subjects design. The independent variable was type of target advert, which could be for one of two alcoholic drinks (both ciders: Magners or Bulmers), a non-alcoholic soft drink (Pepsi), or a non-beverage control (Beats headphones). Pairs of participants were randomly allocated to experimental condition. Dependent variables were drink choice, sipping rate and drink volume. As drink choice and drink volume were strongly correlated (Bulmers: $r = .81, p < .001$; Magners: $r = .77, p < .001$; Pepsi: $r = .93, p < .001$; Dr Pepper: $r = .88, p < .001$), analyses regarding drink volume are reported in supplementary analyses.

Procedure

Participants were asked to bring a friend to take part in a study on the relation between TV viewing behaviour and mood. Participants were instructed to share the eligibility criteria with their friend before making an appointment and to ensure that both of them were eligible to take part. To disguise the real aims of the study, they were told that the content of the programme may be emotional and that their emotional expressions would be filmed during the experiment. Upon arrival in the lab, participants were breathalysed (all participants had a breath alcohol level of zero), their height and weight were recorded by the experimenter. Then, the experimenter explained to them that their emotional response to the TV programme would be filmed with a webcam. In reality, participants were monitored to measure their drinking behaviour. The pair of participants was taken to a laboratory that looked like a living room, which contained a fridge that was filled with drinks (two alcoholic ciders: *Bulmers*, *Magner*; two non-alcoholic soft-drinks: *Pepsi*, *Dr Pepper*). First, they were asked to fill out a mood questionnaire. Then, the experimenter explained the procedure for the rest of the study: They

were told that they would watch a show on TV and fill out another mood questionnaire at the end of it. To make it as realistic as possible, there were advert breaks just as you would get at home and there were refreshments available for them to consume. Participants were told that they were free to have as much or as little to drink as they wanted. To comply with ethical procedures, the experimenter monitored participants' alcohol consumption via the webcam to make sure that participants did not consume more than 0.8g/kg of alcohol (no more than 4 cans of cider for the average UK male (84.0kg) or 3 cans for the average UK female (71.1kg; Scantlebury & Moody, 2014) and to prevent any adverse events. None of the participants exceeded this amount. Then, the experimenter started the programme and left the room. An episode of the TV series QI was shown, interrupted by four advert breaks. During each advert break, participants would either see an advertisement for *Bulmers*, *Magners*, *Pepsi* or *Beats by Dr Dre* among two neutral filler advertisements, which differed in each advert break. Advert breaks were embedded at 2'24", 8'42", 14'39", and 19'57", which meant that participants had the opportunity to select a drink before they saw the target advert. Nevertheless, we chose this set up (as opposed to showing the advertisements at the start of the study) to reduce potential demand effects. The experimenter monitored the participants from another room, recorded what they drank and at what time in relation to the adverts. After this, the experimenter returned to the lab and participants were asked to fill out questionnaires measuring hazardous recent alcohol consumption (a 14-day retrospective timeline followback diary; Sobell & Sobell, 1992), hazardous drinking (AUDIT; Saunders et al., 1993), motivation to reduce drinking (RTCQ; Rollnick et al., 1992), attitudes towards the brands and advertisements, and alcohol marketing receptivity. Then, they received a funnelled debrief to measure demand effects. Finally, participants were thanked for their participation and received a £5 high street voucher each. The experiment took approximately 55 minutes in total and took place on weekdays between 13.00 and 18.00.

TV programme

The TV programme was an episode of the comedy series *QI* (series K, episode 8 “Keys”, first broadcast on October 25th 2013; Talkback, London, UK) which contained no reference to alcohol or drinking culture. The programme lasted 28 minutes and was divided into 5 parts.

Advertising

Participants received 4 advertisement breaks, each of which contained the target advert and two neutral adverts. This was based on the studies by Engels et al. (2009) and Koordeman, Anschutz, & Engels (2011) who showed their participants 4 alcohol adverts throughout the experiment. The target advert was repeated in each break, but the accompanying neutral adverts differed across breaks. The neutral adverts were for non-appetitive products and services, such as insurance, technology and toiletries. The order in which the target and neutral advertisements were shown was randomized on a break-by-break basis. Each condition had one target advertisement: *Bulmers*, *Magners*, *Pepsi* or *Beats by Dr Dre*. The target advertisements were selected through an online pilot ($N = 113$) in which participants watched a series of adverts. These four adverts were chosen because they did not differ from each other in how much participants liked the adverts or brands.

Drink choice, volume consumed and sipping behaviour

There were four brands available to consume during the experiment: *Bulmers*, *Magners*, *Pepsi* and *Dr Pepper*. The alcohol and soda brands were selected through an online pilot in which participants were asked to rate how much they liked ten lager, ten cider and ten soft drinks brands and how often they consumed them ($N = 112$). The brands were chosen because they were similar in liking and consumption frequency (see Figure 4.1), but not the most liked

and most frequently consumed as previous research suggests that brand priming does not influence brand choice when participants already have an existing, strong habit of drinking that brand (Verwijmeren, Karremans, Stroebe, & Wigboldus, 2011). Drink choice and sipping behaviour were video recorded during the experiment. We measured the left over volume of any drinks that were not finished at the end of the TV programme and subtracted that from the total volume selected to calculate volume consumed for each drink. The cans of soda and alcohol differed in volume. Therefore, we divided the volume consumed by the volume in the can (440ml in alcohol cans, 330ml in soda cans) to calculate the number of cans participants consumed. We synchronized the video recordings with the TV programme to match the sipping of the participants in relation to the advertisements.

Recall and attitudes

Two measures of advertising recall were used: A free recall measure in which participants were asked to write down all the brands they saw advertising for, followed by a prompted recognition measure wherein participants were shown a list of brands and asked to indicate which brands they had seen an advertisement for. Afterwards, attitudes towards the brands, advertisements and TV programme were measured using 5 items answered on 9-point Likert scales (e.g., “I liked the Bulmers advertisement”).

Alcohol marketing receptivity and familiarity

Receptivity to alcohol marketing was measured with three questions: “Have you ever owned an item with an alcohol brand name on it?”, “Would you want to own or use an item with an alcohol brand name on it?” and “What is the brand name of your favourite alcohol advertisement?” (Henriksen, Feighery, Schleicher, & Fortmann, 2008). The highest level of receptivity was assigned to participants who owned or wanted to own or use a promotional

item; a moderate level to participants who did not own nor wanted to own or use promotional items, but named a favourite commercial; and the lowest level to participants who neither owned/wanted promotional items nor had a favourite commercial. Additionally, participants were asked whether they had seen the target advertisements before taking part in the study.

Data analysis

To take into account possible clustering effects, we used multilevel modelling with participants (level 1) nested within pairs (level 2). All analyses were performed in MLwiN 2.30.

Advertising

Drink choice

To analyse the influence of advertising condition on drink choice, we created multilevel multivariate response models with Bulmers, Magners, Pepsi and Dr Pepper selection after exposure to the advertising condition (Binary: consumed/not consumed) as the dependent variables (DVs) for the brand-specific analyses and alcohol and soda consumption as the DVs for the non-specific analyses. Non-specific analyses were only performed if the brand-specific model was non-significant, to explore a more general effect of alcohol advertising on drink choice. Target advertisement (Bulmers, Magners, Pepsi, Beats by Dr Dre) was included as a dummy coded predictor in the analysis.

Sipping behaviour

To analyse the effect of alcohol-advertising on participants' sipping behaviour, sips were coded in relation to the target advertisement. For each participant, we quantified: (1) sipping ratio during sensitive time (number of sips per minute of advert display time) and (2) sipping ratio outside of sensitive time (number of sips per minute of non-advert display time).

We created multilevel multivariate response models with an additional within subjects level of time ratio (sensitive/non-sensitive time). Sipping ratios for Bulmers, Magners, Pepsi and Dr Pepper (continuous: sips per minute) were the DVs for the brand-specific analyses and sipping ratios for alcohol and soda were the DVs for the non-specific analyses. Non-specific analyses were only performed if the brand-specific model was non-significant, to explore a more general effect of the predictors on immediate alcohol consumption.

Social influence

Drink choice

To analyse the influence of social mimicry on drink choice, we created multilevel multivariate response models with Bulmers, Magners, Pepsi and Dr Pepper selection at any point during the experiment (Binary: consumed/not consumed) as the dependent variables (DVs) for the brand-specific analyses and alcohol and soda consumption as the DVs for the non-specific analyses. Non-specific analyses were only performed if the brand-specific model was non-significant, to explore a more general effect of social mimicry on alcohol consumption. Partner's drink choice for Bulmers, Magners, Pepsi and Dr Pepper (Binary: consumed/not consumed) were included as the predictors.

Sipping behaviour

Sipping behaviour was coded in relation to the participants' drinking partners' sipping behaviour. A sip was considered to be mimicked if it occurred within 10 seconds of their partner's previous sip (Larsen, Engels, et al., 2010). Two sipping ratios were created: (1) mimicked sipping ratio, which was qualified as the number of mimicked sips divided by the number of seconds of sensitive time (10 seconds after partner's previous sip) and (2) non-mimicked sipping ratio, which was qualified as the number of non-mimicked sips divided by the number of seconds of non-sensitive time (outside the 10 seconds interval after partner's

previous sip; see Hermans et al., 2012). A t-test was carried out to compare the mimicked sipping ratio with the non-mimicked ratio. A significantly higher ratio of mimicked sips versus non-mimicked sips demonstrate that participants were more likely to sip during the sensitive period and would therefore be indicative of a mimicry effect on sipping. To explore the degree to which sipping mimicry is brand specific, we created a linear multivariate response model with the participants' total number of sips of each brand (Bulmers, Magners, Pepsi, and Dr Pepper) as the DVs and their partners' total number of sips of each brand as the predictors.

Advertising and social mimicry

Drink choice

To analyse whether the inclusion of social mimicry as a predictor affected the influence of alcohol advertising on drink choice, we created multilevel multivariate response models with Bulmers, Magners, Pepsi and Dr Pepper selection after exposure to the advertising condition (Binary: consumed/not consumed) as the dependent variables. Target advertisement (Bulmers, Magners, Pepsi, Beats by Dr Dre) and partner's drink choice for Bulmers, Magners, Pepsi and Dr Pepper (Binary: consumed/not consumed) were included as the predictors in the analysis.

Table 4.1. Participant characteristics across conditions.

Variable	Advertising condition				Total
	Bulmers-condition (<i>n</i> = 32)	Magners-condition (<i>n</i> = 32)	Pepsi-condition (<i>n</i> = 32)	Beats-condition (<i>n</i> = 32)	
	<i>M</i> (SD)	<i>M</i> (SD)	<i>M</i> (SD)	<i>M</i> (SD)	<i>M</i> (SD)
Gender (% female)	59	84	72	75	73
Age (years)	22.03 (6.89)	20.40 (3.09)	22.03 (4.30)	19.91 (1.65)	21.10 (4.47)
Weekly alcohol consumption (UK units)	19.51 (13.58)	18.54 (8.08)	14.72 (8.85)	21.74 (13.29)	18.62 (11.39)
AUDIT	12.59 (5.93)	13.19 (3.61) ^a	10.84 (4.81) ^{a,b}	15.38 (5.20) ^b	13.00 (5.17)
RTCQ Precontemplation	.50 (3.19) ^a	-1.16 (2.05) ^{a,b,c}	1.44 (2.69) ^{b,d}	-.03 (2.33) ^{c,d}	.19 (2.74)
RTCQ Contemplation	-1.00 (3.31) ^a	-.34 (2.67) ^b	-3.06 (3.26) ^{a,b,c}	-.66 (2.81) ^c	-1.27 (3.18)
RTCQ Action	-2.25 (4.06) ^a	-2.94 (3.26) ^b	-4.72 (2.99) ^{a,b,c}	-2.25 (3.69) ^c	-3.04 (3.63)
Identified aims (%)	50 ^a	46.9 ^b	43.8 ^c	12.5 ^{a,b,c}	38.3
Aware of measuring consumption (%)	75	78.1	71.9	68.8	73.5

Note: same superscript in row indicates significant differences between conditions at $t(62) > 2.00, p < .05$ or $\chi^2(1) > 3.85, p < .05$.

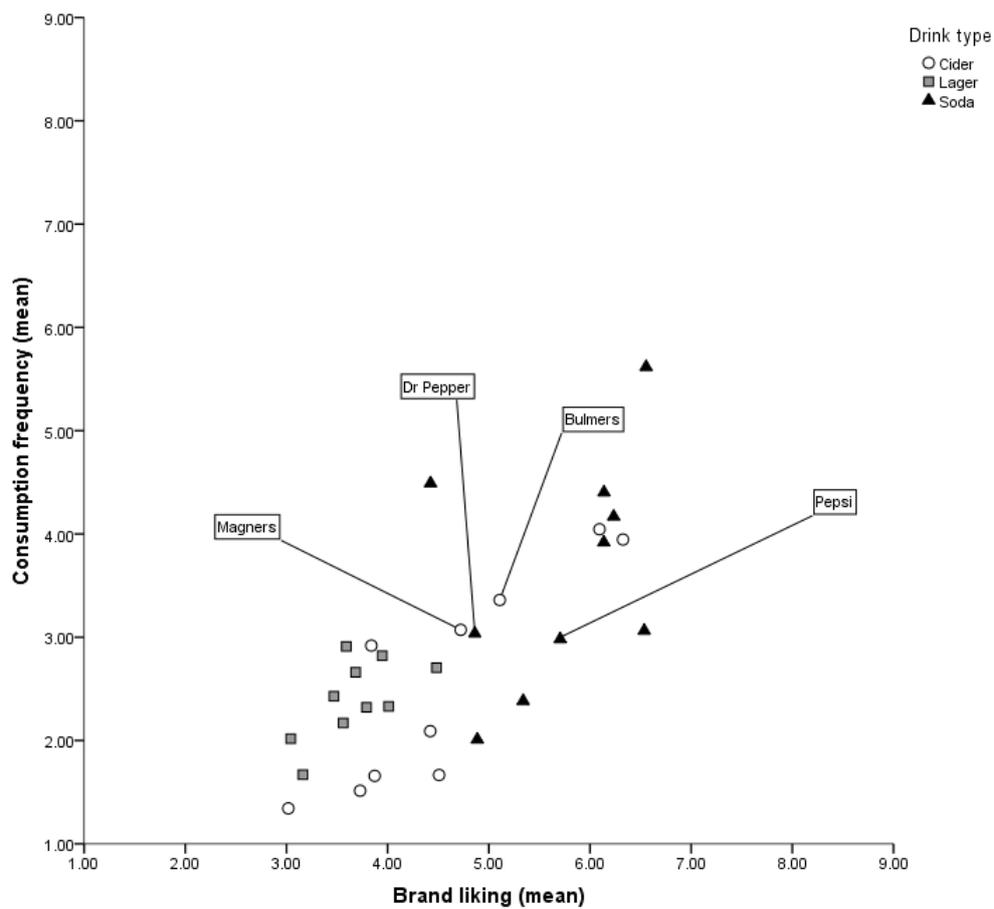


Figure 4.1. Mean brand liking and consumption frequency of all piloted cider (n = 10), lager (n = 10) and soda brands (n = 10). Brand liking and consumption frequency were answered on 9-point Likert scales.

4.4 Results

Participant characteristics

A one-way (target advert: Bulmers, Magners, Pepsi, Beats by Dr Dre) MANOVA with age, recent alcohol consumption, AUDIT scores, and the RTCQ Precontemplation, Contemplation and Action subscales as dependent variables revealed significant group differences between conditions. There were significant group differences in AUDIT scores ($F(3, 119) = 4.85, p = .003, \eta^2_p = .11$), RTCQ Precontemplation scores ($F(3, 119) = 5.93, p = .001, \eta^2_p = .13$), RTCQ Contemplation scores ($F(3, 119) = 5.34, p = .002, \eta^2_p = .12$), and RTCQ Action scores ($F(3, 119) = 3.15, p = .03, \eta^2_p = .08$). Post-hoc t-tests were conducted to investigate which conditions significantly differed on AUDIT, RTCQ Precontemplation, RTCQ Contemplation and RTCQ Action scores. Means and t-test results are displayed in Table 4.1. Groups did not significantly differ in age ($F(3, 119) = 1.92, p = .13, \eta^2_p = .05$) or recent alcohol consumption ($F(3, 119) = 2.15, p = .10, \eta^2_p = .05$).

Brand liking, consumption frequency and liking for target ad

A one-way (target advert: Bulmers, Magners, Pepsi, Beats by Dr Dre) MANOVA with liking and consumption frequency of Bulmers, Magners, Pepsi and Dr Pepper and target ad liking as dependent variables revealed no significant group differences between conditions. Groups did not differ in how much they liked or how often they consumed Bulmers, Magners, Pepsi or Dr Pepper (all $ps > .20$), nor in how much they liked the target ad ($p = .27$).

Drink choice

Advertising

Ten participants (7.8%) did not consume any of the drinks available (Bulmers = 2; Magners = 0; Pepsi = 5; Beats = 3). Seventy-seven participants (60.0%) selected one can to

drink (Bulmers = 25; Magners = 20; Pepsi = 12; Beats = 20). Forty participants (31.3%) selected more than one can to drink (Bulmers = 5; Magners = 12; Pepsi = 15; Beats = 9). Table 4.2 shows the distribution of drink choice across conditions. 74% of participants started consuming their first drink before the first target advertisement. Because this precludes attribution of drink choice to exposure to advertisements, these data were excluded from analyses of drink choice.

The multivariate response models testing a brand-specific ($\chi^2(12) = 74.71$, $p < .001$) and non-specific ($\chi^2(6) = 30.84$, $p < .001$) effect of advertising on drink choice were a significantly better fit than constant-only models, but none of the individual predictors reached significance (see Table 4.3).

Social influence

Multivariate response model indicated a brand-specific effect of partner's drink choice on participant drink choice ($\chi^2(16) = 139.97$, $p < .001$, see Table 4.4). A partner selecting Bulmers increased the odds of participants selecting Bulmers ($z = 5.41$, $p < .001$, Odds ratio = 31.88), but not the odds of selecting Magners ($z = 1.58$, $p = .11$, Odds ratio = 2.81), Pepsi ($z = .26$, $p = .79$, Odds ratio = .81), or Dr Pepper ($z = .04$, $p = .97$, Odds ratio = 1.03). Likewise, a partner selecting Magners increased the odds of participants selecting Magners ($z = 3.72$, $p = .002$, Odds ratio = 7.20), but not the odds of selecting Bulmers ($z = 1.88$, $p = .06$, Odds ratio = 2.86), Pepsi ($z = .43$, $p = .67$, Odds ratio = .73), or Dr Pepper ($z = .17$, $p = .86$, Odds ratio = 1.12), and a partner selecting Pepsi increased the odds of participants selecting Pepsi ($z = 1.97$, $p = .048$, Odds ratio = 3.33), but not the odds of selecting Bulmers ($z = 1.06$, $p = .29$, Odds ratio = .50), Magners ($z = .72$, $p = .47$, Odds ratio = .63), or Dr Pepper ($z = .70$, $p = .48$, Odds ratio = 1.52). A partner selecting Dr Pepper did not affect the odds of participants selecting any brand (all $ps > .39$).

Advertising and social influence

As there was a brand-specific effect of mimicry, we only analysed the brand-specific effects of social influence and advertising on drink choice. The multivariate response models testing a brand-specific ($\chi^2(28) = 383.33$, $p < .001$) effect of advertising and partner's drink choice on drink choice after exposure to the first advert were a significantly better fit than constant-only models. The brand-specific effect of advertising remained non-significant (all $ps > .10$). Controlling for the effects of social influence did not affect the effect of advertising condition on drink choice.

Sipping behaviour

Advertising

Multivariate response models showed no evidence of a brand-specific ($\chi^2(28) = 32.88$, $p = .24$) or non-specific ($\chi^2(14) = 18.75$, $p = .17$) effect of advertising on sipping behaviour (see Table 4.5). Participants were not more likely to sip the advertised brand (or drink type) in close proximity to advert exposure.

Social influence

Paired sample t-tests showed that participants were more likely to sip during sensitive periods ($M = .020$, $SD = .015$) than non-sensitive periods ($M = .012$, $SD = .007$, $t(113) = 6.40$, $p < .001$). The multivariate response model indicated a non-specific effect of partner's sipping frequency on participant's sipping frequency ($\chi^2(16) = 55.89$, $p < .001$, see Table 4.6). Higher Bulmers sipping frequency of the partner increased Bulmers ($z = 3.67$, $p < .001$) and Magners sipping frequency ($z = 3.67$, $p < .001$), but not Pepsi ($z = 1.00$, $p = .16$) or Dr Pepper ($z = 1.25$, $p = .11$). Likewise, higher partner consumption of Magners increased the consumption of Magners ($z = 4.44$, $p < .001$) and Bulmers ($z = 3.25$, $p < .001$), but not Pepsi ($z = .71$, $p = .24$) or Dr Pepper ($z = 1.36$, $p = .09$), and higher partner consumption of Pepsi increased the

consumption of Pepsi ($z = 2.30, p = .01$), but not Dr Pepper ($z = 1.38, p = .08$), Bulmers ($z = .78, p = .22$) or Magners ($z = .46, p = .32$). Partners' Dr Pepper sipping frequency did not affect sipping frequencies of any brand (all $ps > .06$).

Marketing receptivity

Ordinal regression analysis showed that there were no significant group differences in level of marketing receptivity ($\chi^2(3) = 5.21, p = .16$). Adding marketing receptivity and its interaction with target ad to the multilevel model predicting consumption volume⁷ did not significantly improve model fit for the brand-specific model ($\chi^2(32) = 32.81, p = .43$), nor the general model ($\chi^2(16) = 10.39, p = .84$).

Awareness of aims

A large minority of participants correctly guessed the aims of the study ($n = 49, 38.3\%$). A chi-square test revealed that aim awareness differed across condition ($\chi^2(3) = 12.27, p = .007$; see Table 4.1). A multilevel binary response model with awareness of aims as a predictor of drink choice was not a significantly better fit than a constant only model ($\chi^2(4) = 1.73, p = .79$), suggesting that awareness of aims did not affect drink choice.

The majority of participants were aware that their consumption would be monitored ($n = 94, 73.4\%$). A chi-square test revealed that advertising condition did not affect awareness of consumption monitoring ($\chi^2(3) = .80, p = .85$; see Table 4.1).

⁷ It was not possible to investigate the interaction between marketing receptivity and target ad on drink choice, due to empty cells.

Table 4.2. Number of cans of Bulmers, Magners, Pepsi and Dr Pepper (rows) selected in the different advertising conditions (columns) split by participants who consumed one drink (or less) or more than one. Cans that were not consumed in their entirety, were rounded up to 1 can. This table shows the number of cans consumed of each brand, rather than number of participants who consumed each brand, because some participants consumed more than one brand.

Group	Drink choice	Bulmers ad	Magners ad	Pepsi ad	Beats ad
		number of cans	number of cans	number of cans	number of cans
Selected one drink (<i>n</i> = 77)	Bulmers	5	3	1	2
	Magners	2	2	1	0
	Pepsi	6	7	4	7
	Dr Pepper	12	8	6	11
Selected more than one drink (<i>n</i> = 40)	Bulmers	5	8	9	4
	Magners	3	7	12	4
	Pepsi	0	3	4	1
	Dr Pepper	1	2	4	4

Table 4.3. Logistic multilevel multivariate response model of the effect of advertising on the odds of participants selecting Bulmers, Magners, Pepsi or Dr Pepper (Brand-specific analysis) or the odds of selecting alcohol or soda (general analysis).

	Brand-specific								General			
	Bulmers		Magners		Pepsi		Dr Pepper		Alcohol		Soda	
Target ad (dummy coded)	<i>b</i> (SE)	Odds ratio	<i>b</i> (SE)	Odds ratio	<i>b</i> (SE)	Odds ratio	<i>b</i> (SE)	Odds ratio	<i>b</i> (SE)	Odds ratio	<i>b</i> (SE)	Odds ratio
Bulmers	0 (1.11)	1	-.73 (1.36)	.48	-1.17 (1.28)	.31	-1.76 (1.20)	.17	-.26 (.89)	.77	-1.63 (.89) ⁺	.20
Magners	.25 (1.07)	1.29	1.17 (1.01)	3.23	.73 (.90)	2.08	-.08 (.80)	.93	.82 (.80)	2.27	.37 (.62)	1.44
Pepsi	.73 (1.03)	2.08	1.70 (.98) ⁺	5.48	-.51 (1.07)	.60	-.34 (.83)	.72	1.23 (.79)	3.42	-.46 (.68)	.63
Beats (reference)	0 (-)	1	0 (-)	1	0 (-)	1	0 (-)	1	0 (-)	1	0 (-)	1
$\chi^2(12) / \chi^2(6)$	74.71***								30.84***			

Note: ⁺ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Table 4.4. Logistic multivariate response model of the effect of partner’s drink choice on the odds of participants consuming Bulmers, Magners, Pepsi or Dr Pepper.

Partner’s drink choice	Participant drink choice							
	Bulmers		Magners		Pepsi		Dr Pepper	
	<i>b</i> (SE)	Odds ratio	<i>b</i> (SE)	Odds ratio	<i>b</i> (SE)	Odds ratio	<i>b</i> (SE)	Odds ratio
Bulmers	3.46 (.64)***	31.88	1.03 (.65)	2.81	-.21 (.82)	.81	.03 (.73)	1.03
Magners	1.05 (.56) ⁺	2.86	1.97 (.53)**	7.20	-.31 (.72)	.73	.11 (.63)	1.12
Pepsi	-.69 (.65)	.50	-.46 (.64)	.63	1.20 (.61)*	3.33	.42 (.60)	1.52
Dr Pepper	-1.06 (.54)	.35	-.29 (.52)	.75	.004 (.55)	1.00	.44 (.51)	1.55
$\chi^2(16)$	139.97***							

Note: ⁺ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Table 4.5. Linear multilevel multivariate response model on the effect of advertising and time period (sensitive/non-sensitive) on Bulmers, Magners, Pepsi, and Dr Pepper sipping ratios (Brand-specific analysis) or alcohol and soda sipping ratios (General analysis)

Variable	Brand-specific				General	
	Bulmers	Magners	Pepsi	Dr Pepper	Alcohol	Soda
	<i>b</i> (SE)	<i>b</i> (SE)	<i>b</i> (SE)	<i>b</i> (SE)	<i>b</i> (SE)	<i>b</i> (SE)
Bulmers	.02 (.12)	-.01 (.09)	-.04 (.07)	-.06 (.10)	.01 (.16)	-.10 (.11)
Magners	.05 (.12)	.09 (.09)	.05 (.07)	-.16 (.10)	.14 (.16)	-.11 (.11)
Pepsi	-.04 (.12)	.08 (.09)	-.01 (.07)	-.17 (.10)	.05 (.16)	-.18 (.11)
Beats (reference)	-	-	-	-	-	-
Time period	-.03 (.04)	.01 (.03)	.01 (.05)	-.04 (.06)	-.02 (.05)	-.04 (.07)
Bulmers × Time period	.06 (.05)	.05 (.05)	.07 (.06)	.02 (.08)	.12 (.07)	.08 (.11)
Magners × Time period	.10 (.05) ⁺	-.05 (.05)	-.03 (.06)	.20 (.08)*	.05 (.07)	.17 (.10)
Pepsi × Time period	.01 (.05)	-.07 (.05)	.01 (.06)	.01 (.08)	-.05 (.07)	.02 (.10)
Beats × Time period (reference)	-	-	-	-	-	-
$\chi^2(28) / \chi^2(14)$	32.88				18.75	

Note: ⁺ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Table 4.6. Linear multivariate response model of the effect of partner's sipping frequency on Bulmers, Magners, Pepsi and Dr Pepper sipping frequency (number of sips).

Partner sipping frequency	Participant sipping frequency			
	Bulmers <i>b</i> (SE)	Magners <i>b</i> (SE)	Pepsi <i>b</i> (SE)	Dr Pepper <i>b</i> (SE)
Bulmers	.33 (.09)***	.22 (.06)***	-.05 (.05)	-.10 (.08)
Magners	.39 (.12)***	.40 (.09)***	-.05 (.07)	-.15 (.11) ⁺
Pepsi	-.14 (.18)	-.06 (.13)	.23 (.10)*	.22 (.16) ⁺
Dr Pepper	-.09 (.12)	-.06 (.08)	.12 (.07) ⁺	.19 (.10) ⁺
$\chi^2(16)$	55.89***			

Note: ⁺ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

4.5 Supplementary analyses

Volume consumed

Analysis strategy

To account for the different serving sizes of alcohol (440 ml per can) and soft drink (330 ml per can), we defined consumption as the number of cans consumed per brand/drink type. To analyse drink consumption we created multilevel multivariate response models with Bulmers, Magners, Pepsi and Dr Pepper consumption (continuous: number of cans consumed) as the DVs for the brand-specific analyses and alcohol and soda consumption as the DVs for the non-specific analyses. Non-specific analyses were only performed if the brand-specific model was non-significant, to explore a more general effect of the predictors on alcohol consumption. Target advertisement (Bulmers, Magners, Pepsi, Beats by Dr Dre) was included as a dummy coded predictor in the analyses concerning advertising. In the analyses concerning social influence, we included partner's Bulmers, Magners, Pepsi and Dr Pepper consumption (continuous, number of cans consumed) as the predictors. To analyse whether the inclusion of social mimicry as a predictor affected the influence of alcohol advertising on alcohol consumption, we created multilevel multivariate response models with Bulmers, Magners, Pepsi and Dr Pepper consumption (continuous: number of cans consumed) as the dependent variables. Target advertisement (Bulmers, Magners, Pepsi, Beats by Dr Dre) and partner's Bulmers, Magners, Pepsi and Dr Pepper consumption (continuous, number of cans consumed) were included as the predictors in the analysis.

Results – alcohol advertising

Multilevel multivariate response models showed no evidence of a brand-specific ($\chi^2(12) = 9.22, p = .68$) or non-specific ($\chi^2(6) = 3.90, p = .69$) effect of advertising on drink consumption (see Table 4.7).

Results – social influence

The multilevel multivariate response model indicated a non-specific effect of partner's drink consumption on participant drink consumption ($\chi^2(16) = 56.58, p < .001$, see Table 4.8). Higher partner consumption of Bulmers increased the consumption of Bulmers ($z = 4.44, p < .001$) and Magners ($z = 3.4, p < .001$), but not Pepsi ($z = .67, p = .50$) or Dr Pepper ($z = 1.63, p = .10$). Likewise, higher partner consumption of Magners increased the consumption of Magners ($z = 4.44, p < .001$) and Bulmers ($z = 3.50, p < .001$), but not Pepsi ($z = 1.00, p = .32$) or Dr Pepper ($z = 1.08, p = .28$), and higher partner consumption of Pepsi increased the consumption of Pepsi ($z = 2.80, p = .005$), but not Dr Pepper ($z = 1.08, p = .28$), Bulmers ($z = .36, p = .72$) or Magners ($z = .50, p = .62$). Higher partner consumption of Dr Pepper increased the consumption of Pepsi ($z = 2.38, p = .02$), but not Dr Pepper ($z = .04, p = .97$), Bulmers ($z = .11, p = .91$) or Magners ($z = .10, p = .92$).

Results – alcohol advertising and social influence

As there was a brand-specific effect of mimicry, we only analysed the brand-specific effects of social influence and advertising on volume consumed. The multivariate response models testing a brand-specific ($\chi^2(28) = 64.29, p < .001$) effect of advertising and partner's volume consumed on alcohol consumption were a significantly better fit than constant-only models. The brand-specific effect of advertising remained non-significant (all $ps > .12$). Controlling for the effects of social influence did not affect the effect of advertising condition on volume consumed.

Table 4.7. Multilevel multivariate response model of the effect of advertising on the consumption of Bulmers, Magners, Pepsi or Dr Pepper (number of cans).

	Brand-specific				General	
	Bulmers	Magners	Pepsi	Dr Pepper	Alcohol	Soda
Target ad (dummy coded)	<i>b</i> (SE)	<i>b</i> (SE)	<i>b</i> (SE)	<i>b</i> (SE)	<i>b</i> (SE)	<i>b</i> (SE)
Bulmers	.10 (.12)	.004 (.13)	-.07 (.10)	-.05 (.11)	.10 (.20)	-.13 (.14)
Magners	.05 (.12)	.17 (.13)	.05 (.10)	-.11 (.11)	.22 (.20)	-.06 (.14)
Pepsi	-.03 (.12)	.09 (.13)	.03 (.10)	-.16 (.11)	.05 (.20)	-.13 (.14)
Beats (reference)	-	-	-	-	-	-
$\chi^2(12) / \chi^2(6)$	9.22				3.90	

Note: ⁺ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Table 4.8. Multilevel multivariate response model of the effect of partner's drink consumption on Bulmers, Magners, Pepsi and Dr Pepper consumption (number of cans).

Partner consumption	Participant consumption			
	Bulmers <i>b</i> (SE)	Magners <i>b</i> (SE)	Pepsi <i>b</i> (SE)	Dr Pepper <i>b</i> (SE)
Bulmers	.40 (.09)***	.34 (.10)***	-.06 (.09)	-.18 (.11)
Magners	.28 (.08)***	.40 (.09)***	-.07 (.07)	-.14 (.09)
Pepsi	-.04 (.11)	-.06 (.12)	.28 (.10)**	.14 (.13)
Dr Pepper	-.01 (.09)	.01 (.10)	.19 (.08)*	.004 (.11)
$\chi^2(16)$	56.58***			

Note: + $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

4.6 Discussion

Our study set out to investigate whether alcohol advertising has a brand-specific effect on immediate alcohol consumption. We hypothesized that alcohol advertising would increase short-term alcohol consumption compared to soda and control adverts, and that this would be particularly apparent in terms of increased consumption of the specific product that was advertised. Our hypothesis was not confirmed. We found no evidence that alcohol advertising influenced proximal drinking behaviour, neither brand-specific nor general consumption.

Our findings contradict the findings from the meta-analysis by Stautz et al. (2016), who found a small, general effect of alcohol advertising on immediate alcohol consumption. This is likely due to a limitation of our study: Three quarters of participants started drinking within the first 2.5 minutes of the experiment, before the first alcohol advert was shown. Therefore, alcohol advertising could not affect drink choice for those participants. This severely limited the number of drinks we could analyse: We had to exclude 66% of the drinks selected throughout the experiment from our main analysis, because they were selected before the first advert was shown. This problem was not reported by Engels et al. (2009) and Koordeman et al. (2012), whose research we based our procedure on, even though they showed their first alcohol advert much later into the experiment, giving participants a larger window of opportunity to select their first drink before the advertising manipulation had taken place (14.5 minutes and 11 minutes, respectively). There are a few procedural differences that may account for these differences: Both Engels et al. (2009) and Koordeman et al. (2012) used a 60 minute film, whereas we used a TV programme that lasted 35 minutes. They also used smaller alcohol serving sizes (150 – 250ml per drink) than our current study (330 – 440ml per drink). That means that their reported mean consumption of 2.05 drinks (Engels et al., 2009) and 1.33 drinks (Koordeman et al., 2012) would equate to roughly one drink in our study. Together, these differences mean that participants had less opportunity in our study to select more than one drink, compared to the studies by Engels et al. (2009) and Koordeman et al. (2012).

Our results also showed strong social mimicry effects on alcohol consumption. Participants mimicked drink (and brand) choice, volume consumed (see supplementary analyses) and sipping behaviour. These findings are in line with existing literature on social mimicry of alcohol consumption (Dallas et al., 2014; Larsen, Engels, et al., 2010; Larsen et al., 2012; Larsen, Overbeek, et al., 2010). These previous studies demonstrated that participants were more likely to consume alcohol if their drinking partner consumed alcohol instead of soda (Dallas et al., 2014; Larsen et al., 2012; Larsen, Overbeek, et al., 2010). Additionally, participants mimicked their partner's sipping behaviour more if both of them consumed the same drink type (Larsen, Engels, et al., 2010). Our findings demonstrated that mimicry of drink choice was brand-specific: Participants were more likely to select the same alcohol brand as their drinking partner. However, mimicry of drink volume and sipping only depended on whether both participants consumed the same drink type (alcohol or soda), but not on participants consuming the same brand. Across all variables, mimicry was stronger for alcohol consumption than soda. Considering these strong peer influences on alcohol consumption, it is possible that peer influences overshadowed any effect of alcohol advertising on immediate alcohol consumption.

There are other possible explanations for the discrepancy in findings compared to the meta-analysis by Stautz et al. (2016). For example, like another study that showed no effect of alcohol advertising on immediate alcohol consumption (Koordeman et al., 2012), our study showed the alcohol advertising in the absence of any other alcohol cues embedded in the film/TV programme, whereas other studies showed the adverts in combination with additional alcohol cues. However, it is unlikely that this would have had any additional effect above and beyond peer influence, given our small sample size. Additionally, it is possible that the advertisements we used in this study were not aimed at the demographic of our study sample. Advertisements are often designed to target a specific market segment, rather than to be attractive to all potential consumers (see for example Cahill, 1997). As information about the target population for these specific adverts was not available, our sample might have differed from the target population on key characteristics, which may have reduced the

advertises' persuasiveness.

Our results are not in line with the findings by Ross et al. (2014), who showed that alcohol advertising increases long-term consumption of the advertised brand specifically. As we found no evidence of a brand-specific effect, it is unlikely that their findings are driven by an increased propensity to drink the advertised brand closely after watching the advert. Alcohol advertising might influence drinking in the long term more indirectly, by altering drinking (Fleming et al., 2004) and purchasing intentions (Chen, Grube, Bersamin, Waiters, & Keefe, 2005) and by affecting alcohol-related attitudes (Morgenstern, Isensee, Sargent, & Hanewinkel, 2011). Additionally, longitudinal studies investigating the effect of alcohol advertising commonly use a younger sample of adolescents, whereas studies looking into ad-lib alcohol consumption use older participants, who are of legal drinking age. A recent meta-analysis on snack food advertising showed that food advertising only affected immediate eating behaviour in children, but not in adults (Boyland et al., 2016). In light of the current findings, it is possible that any acute effects of alcohol advertising are limited to young people as well.

Our study had some additional limitations to the one discussed previously. A large minority (38%) guessed the study aims and participants in the alcohol/soda advertising conditions were more likely to guess the aims of the study than those in the control condition. It is possible that participants (un)consciously adjusted their behaviour. However, our analyses showed that awareness of study aims did not affect drink choice. A final limitation of this study is the sample size. As the meta-analysis by Stautz et al. (2016) had not been published at the time of data collection, we based our power calculation on effect sizes from Engels et al. (2009) and Koordeman et al. (2012), as they used similar methodologies, and recruited a large enough sample to detect a medium effect. Our study is underpowered to detect the small effect size that was found by Stautz et al. (2016), which was exacerbated by the reduction in power due to participants selecting their drinks before the advertising manipulation. Our study also had strengths. The study was conducted in a semi-naturalistic environment and participants were free to take any drinks without having to order it from an

experimenter. We used both neutral and non-alcoholic drink adverts as control conditions, in order to isolate the effect of alcohol advertising from general appetitive drinks advertising. Unlike some previous studies (Engels et al., 2009; Koordeman, Anschutz, & Engels, 2011), the TV programme did not show any additional alcohol cues, making alcohol advertising the only alcohol cue that could influence behaviour. Finally, we controlled for clustering in the data due to drinking in pairs and we investigated the effect of alcohol advertising in the context of peer influences on immediate alcohol consumption.

To conclude, we found no evidence of a brand-specific, nor general, effect of alcohol advertising on ad-lib alcohol consumption. Given the serious limitation of the methods that we used and the inconsistencies in research designs and analysis methods in the literature, these results should be interpreted with caution.

Chapter 5

Visual attention to alcohol cues and responsible drinking statements within alcohol advertisements and public health campaigns: relationships with drinking intentions and alcohol consumption in the laboratory

The studies described in Chapter Two indicated that warning labels on alcohol packaging attracted minimal attention and individual differences in attention to warning labels did not predict how much participants intended to consume in the subsequent week. In this chapter, I investigated visual attention to responsible drinking statements and alcohol cues in UK public health campaigns and alcohol advertising. In Study 5.1, I investigated attention to responsible drinking statements in public health campaigns and their effect on drinking intentions using a between-subjects design. In Study 5.2, I investigated how attention to responsible drinking statements and alcohol cues in alcohol advertising predicted alcohol consumption in the laboratory using a cross-sectional design. Findings showed that attention to responsible drinking statements did not predict drinking intentions or immediate alcohol consumption, but visual attention to alcohol portrayal (an actor sipping alcohol) in alcohol advertising predicted increased alcohol consumption in the laboratory. Our results suggested that responsible drinking statements attracted more attention if they were shown in an alcohol product advert or public health campaign with a responsible drinking theme. Future research should investigate how responsible drinking statements can be improved to attract more attention and prompt participants to intend to drink less or actually drink less alcohol.

This chapter is based on Kersbergen, I. & Field, M. (in press). Visual attention to alcohol cues and responsible drinking statements within alcohol advertisements and public health campaigns: relationships with drinking intentions and alcohol consumption in the laboratory. *Psychology of Addictive Behaviors*. The chapter differs from the submitted manuscript at points to incorporate viva

corrections.

Contributions: I designed the study, which was approved by Matt Field (primary supervisor). I collected and analysed the data. Matt Field and Eric Robinson (second supervisor) gave comments on the chapter.

5.1 Abstract

Both alcohol advertising and public health campaigns increase alcohol consumption in the short-term, and this may be attributable to attentional capture by alcohol-related cues in both types of media. The present studies investigated the association between (a) visual attention to alcohol cues and responsible drinking statements in alcohol advertising and public health campaigns, and (b) next-week drinking intentions (study 5.1) and drinking behaviour in the lab (study 5.2). In study 5.1, 90 male participants viewed one of three TV alcohol-related video (conventional advert; advert that emphasized responsible drinking; or public health campaign; between-subjects manipulation) whilst their visual attention to alcohol cues and responsible drinking statements was recorded, before reporting their drinking intentions. Study 5.2 used a within-subjects design in which 62 participants (27% male) viewed alcohol and soda advertisements whilst their attention to alcohol/soda cues and responsible drinking statements was recorded, before completing a bogus taste test with different alcoholic and non-alcoholic drinks. Study 5.1 showed no significant differences between exposure to the three TV alcohol adverts in participants' intentions to drink in the subsequent two weeks. In both studies, alcohol cues attracted more attention than responsible drinking statements, except when viewing a public health TV campaign. Attention to responsible drinking statements was not associated with intentions to drink alcohol over the next week (study 5.1) or alcohol consumption in the lab (study 5.2). However, attention to alcohol portrayal cues within alcohol advertisements was associated with ad-lib alcohol consumption in study 5.2, although attention to other types of alcohol cues (brand logos, glassware, and packaging) was not associated. Future studies should investigate how responsible drinking statements might be improved to attract more attention.

5.2. Introduction

Alcohol is widely advertised and exposure to advertising increases drinking behaviour. For example, in 2012 there were on average 1.24 alcohol references per minute in TV broadcasts of European championship football matches (Adams et al., 2014), and a recent ecological momentary assessment study showed that young adolescents in the USA are exposed to an average of 2.7 alcohol advertisements per day (Rebecca L. Collins et al., 2016). Exposure to alcohol advertising affects drinking behaviour in both the short and the long term. A recent meta-analysis revealed a robust (albeit small) effect of exposure to alcohol advertisements on immediate alcohol consumption among adults (SMD = 0.20, 95 % CI = 0.05, 0.34; Stautz, Brown, King, Shemilt, & Marteau, 2016). In the long term, the effect of alcohol advertising on drinking behaviour in adolescents is dose dependent: Greater exposure to alcohol advertisements over time predicts earlier onset of drinking and increased quantity of alcohol consumed (Anderson, de Bruijn, Angus, Gordon, & Hastings, 2009; Smith & Foxcroft, 2009). To the best of our knowledge, the long-term effect of alcohol advertising on alcohol consumption in adults has not been investigated.

In an attempt to counter the effects of alcohol advertising and other forms of marketing, alcohol public health campaigns and responsible drinking statements within alcohol advertising are commonly used by governments to reduce alcohol-related harm and improve public health (for example ‘Change4Life’; Public Health England, 2012). In the United Kingdom, TV alcohol adverts voluntarily incorporate a responsible drinking statement to promote drinkaware.co.uk, an industry-funded website that gives “comprehensive advice to the public on responsible drinking” (Portman Group, n.d.). As part of the “responsibility deal” (Department of Health, 2011a), a link to the Drinkaware website should be displayed on all alcohol marketing (e.g., print, TV and online adverts) and on alcohol packaging. The inclusion of responsible drinking statements is encouraged, but not mandatory. In order to comply with the voluntary agreement, the website link (and any additional responsible drinking statements) on TV adverts must be displayed for a minimum of four seconds

and include the words “*For the facts [about alcohol]; drinkaware.co.uk*” (“Drinkaware Brand Guidelines For Partners,” 2009).

Research on the effectiveness of alcohol public health campaigns and responsible drinking statements embedded in alcohol marketing is mixed. Stautz and Marteau (2016) demonstrated that viewing TV alcohol public health campaigns reduced urge to drink, compared to alcohol promoting adverts and neutral adverts, in young adults. Increased negative affect after watching the public health campaigns mediated this effect. However, other researchers observed limited or no effect of public health campaigns or responsible drinking statements on drinking behaviour (see Agostinelli & Grube, 2002 for a review), or even unanticipated effects, such as increased alcohol consumption shortly after exposure (Moss et al., 2015) or reduced negative attitudes towards alcohol (K. G. Brown et al., 2015). Some researchers suggest that the limited effectiveness of responsible drinking statements might be attributed to their design and content, as they generally provide little information about alcohol-related harms and provide no clear goals for behaviour change (Al-hamdani, 2014; Martin-Moreno et al., 2013; Claire Wilkinson & Room, 2009).

Individual differences in attentional biases for alcohol-related cues (i.e., the tendency to preferentially direct attention toward those cues) may partially explain why alcohol advertisements and public health campaigns do not consistently influence drinking behaviour. In a recent theoretical model, Field et al. (2016) argued that attentional bias fluctuates in line with the underlying motivational state, and the bias exerts a causal influence on proximal, but not distal, drinking behaviour. On this basis, we suggest that individual differences in attention to different types of visual cues and text statements within alcohol advertising should mediate the influence of those cues/statements on alcohol consumption that occurs soon afterwards. Specifically, attention to responsible drinking statements should be negatively correlated, and attention to alcohol-related cues positively correlated, with alcohol consumption and intentions to drink measured immediately afterwards. Relevant here is a recent study (Moss et al., 2015) in which participants were exposed to either responsible drinking posters (Drinkaware) or general public health posters (Change4Life),

whilst their attention was monitored with an eye tracker. Immediately after viewing posters, their *ad libitum* alcohol consumption was measured with a bogus ‘taste test’. Results indicated that participants who viewed Drinkaware posters attended to images that depicted the positive consequences of alcohol consumption for longer than images that depicted the negative consequences of alcohol consumption and responsible drinking statements. Participants who viewed Drinkaware posters also consumed more alcohol during the taste test than participants who viewed Change4Life posters. The authors suggested that individual differences in allocation of attention to alcohol cues may have accounted for the observed group differences in immediate alcohol consumption, but they did not test this formally. However, even though the presence of alcohol cues in the Drinkaware posters played an important role, we cannot conclude that attention to these cues affected ad-lib alcohol consumption. It is possible that alcohol cues prompted drinking behaviour automatically, regardless of individual differences in attention to these cues.

The purpose of the current studies was to assess visual attention to alcohol cues and responsible drinking statements in alcohol advertising and public health campaigns, and investigate how individual differences in attention predict intentions to drink (study 5.1) and drinking behaviour in the lab (study 5.2). A secondary aim was to gather descriptive information about how much attention people typically direct to responsible drinking statements in public health campaigns and conventional TV alcohol advertisements, because this information is not currently available.

5.3 Study 5.1

The purpose of this study was to measure alcohol consumers’ visual attention to alcohol cues and responsible drinking statements in TV alcohol adverts and public health campaigns, and investigate how this predicts drinking intentions. In a previous study, responsible drinking statements captured more attention when they were presented in alcohol advertisements that emphasized responsible drinking compared to when they were presented in conventional alcohol promoting

advertisements (Thomsen & Fulton, 2007). Therefore, the context in which responsible drinking statements are communicated might be an important moderator of the effectiveness of those statements. Responsible drinking statements can either be embedded in alcohol marketing or communicated independently (i.e., public health campaigns). It has been argued that responsibility statements in alcohol marketing are predominantly used as an additional means to promote the product rather than convey public health information (K. C. Smith et al., 2014). K. C. Smith et al. (2014) showed a variety of strategies that the alcohol industry uses to utilise responsibility statements as a marketing tool, such as using responsibility statements to make promises about the product's effect (e.g., "enjoy responsibly"). This seems to be a successful strategy, as public health campaigns sponsored by individual alcohol brands have been shown to maintain and even increase positive brand evaluations (S. W. Smith et al., 2009). A parallel literature on food advertising showed that an advert for 'healthy' fast food meals did not increase healthier food choices in children, but did increase liking for fast food in general (Boyland, Kavanagh-Safran, & Halford, 2015).

In the present study, we contrasted participants' visual attention to alcohol cues and responsible drinking statements in alcohol adverts and a public health campaign, and investigated how viewing patterns predicted subsequent drinking intentions. Participants were exposed to one of three short videos while we measured their eye-movements: a conventional alcohol public health campaign from Drinkaware; a Heineken alcohol advert with a clear emphasis on responsible drinking; or a conventional Heineken alcohol advert. Regarding participants' eye movements, based on Thomsen and Fulton (2007), we hypothesized that participants who viewed either Heineken advert would attend more to alcohol cues than responsible drinking statements, but the opposite would be the case for participants who viewed the Drinkaware commercial. We also hypothesized that participants who viewed the Drinkaware commercial would pay more attention to responsible drinking statements than participants who viewed either of the Heineken adverts.

Regarding participants' drinking intentions, we selected this as an outcome measure on the basis of findings from a recent study which demonstrated that a single exposure to an anti-binge

drinking campaign affected students' intentions to refrain from binge drinking in the subsequent two weeks (Hendriks, De Bruijn, & Van Den Putte, 2012), and also because Drinkaware (who commissioned the public health campaign used in this study) aims to "raise awareness of alcohol and its harm" (Drinkaware, 2016) and therefore it is likely that the current video was designed with that aim in mind. We hypothesized that participants who watched the Drinkaware commercial would intend to drink less alcohol in the subsequent week compared to those exposed to the conventional Heineken advert and the Heineken advert with a responsible drinking message, but drinking intentions would not differ across participants who viewed the two different Heineken adverts. Regarding hypothesised inter-relationships between attention and drinking intentions, based on Moss et al. (2015), we hypothesized that attention to the responsible drinking statements would be negatively correlated with the amount of alcohol that participants intended to drink in the near future, whereas attention to the alcohol cues would be positively correlated with intended alcohol consumption.

5.3.1 Methods

Participants

We recruited 90 participants to take part in this study, which had a between-subjects design. Participants were recruited via online advertisements circulated among students and staff at the University of Liverpool. Participants had to be male and at least 18 years old. We recruited males only, as the lead characters in the adverts and public health campaign that we presented were all male and therefore we considered men to be the target audience for the adverts (see description of advert content, below). In order to capture participants with a range of drinking behaviours, regular alcohol consumption was not an eligibility criterion. However, three participants were abstainers and were subsequently excluded from all analyses. See Table 5.1 for participant characteristics. The study received ethical approval from the University of Liverpool ethics committee. Testing took place between October 2015 and July 2016.

Advertising/health campaign condition

Participants viewed five videos: four neutral adverts (e.g., comparison websites, insurance), and one of three target adverts / public health campaigns (conventional Heineken advert, Heineken advert with responsible drinking message, or Drinkaware; hereafter referred to as ‘target videos’). The videos were displayed in the same order in each condition, with the target video always being displayed as the fourth advert of five. The target video was varied on a between-subjects basis, but the neutral adverts were the same for all participants. We monitored participants’ eye movements whilst they viewed the adverts using a Gazepoint GP3 eye-tracker sampling at 60Hz (Gazepoint, Vancouver, Canada).

Drinkaware (“Drink Less Miss Less (feat. Lauren Laverne),” 2009; 37 seconds)

This public health campaign shows a Lauren Laverne gig at an outdoor music festival. She asks the crowd if they are enjoying themselves and if she should join them and crowd surf. The audience is shown drinking beer and cheering her on. After she jumps into the crowd, she falls into an empty patch of grass. Then we see a crowd of men and women gathered around a tree. Some are urinating against the tree and others are waiting in a queue. Then, the following text was displayed (and spoken): “Alcohol makes you pee more than water or soft drinks – pace yourself and miss less”, followed by a figure showing the UK government guidelines for lower-risk alcohol consumption. The commercial ended with the displayed text: “Drink less, miss less” and the drinkaware.co.uk logo. The commercial was aired in the UK in 2009 (“Drink Less Miss Less,” 2009).

Heineken advert with responsible drinking message (“Heineken ‘Dance More Drink Slow’ campaign,” 2016; 60 seconds).

This advert shows several snapshots, at different time stamps, of a night out in a club. The first time stamp is at 11.45pm and the last is at 6.12am. The main character in this advert is a young male who is on a night out in this club. He starts his night out by ordering and drinking a bottle of Heineken beer. The next time that he orders a drink, he refuses a bottle of Heineken and requests

water instead. As the night progresses, people around him get more drunk and get into embarrassing situations (e.g., falling over). Throughout the advert, there is a girl who, like the main character, also drinks water and stays sober. At the end of the night, they lock eyes and walk out of the club holding hands. Then, the following text is displayed: “Enjoy the sunrise. Dance more - Drink slow”, followed by the Heineken logo. There was no dialogue and there was club music playing in the background. The advert was aired in the UK in 2014 (Heineken, 2014).

Heineken (traditional advert; “Heineken The Date,” 2011; 91 seconds).

This advert showed a man and a woman on a date. They enter a restaurant/theatre via a secret entrance, followed by a series of brief high-energy encounters between the duo and other characters (e.g., kitchen staff, waiters, other guests). The pair ends at a table, clinking Heineken bottles. There was no dialogue and there was Bollywood music playing in the background. The advert aired in the UK in 2012 (Horsnell, 2012).

Drinking intentions

We measured drinking intentions with three different measures: Next week drinking intentions, next week binge drinking intentions, and drinking intentions for the next drinking occasion.

Next week (Glock & Krolak-Schwerdt, 2013)

We asked participants whether they intended to drink alcohol in the next week (yes/no). If participants answered yes, we asked how many pints of beer/cider, 175ml glasses of wine and shots of spirits they intended to drink in the next week. We calculated their intended consumption in UK units based on their answers (2 UK units for a pint of beer/cider or a 175ml glass of wine and 1 UK unit for a shot of spirits – units were based on the SIPS brief intervention tool; Kaner et al., 2013).

Next week binge drinking intentions (Elliott & Ainsworth, 2012)

We measured next week binge drinking intentions with three questions (“Do you intend to binge drink next week?”, “To what extent do you intend to binge drink next week?”, “How much

do you want to engage in a binge-drinking session in the next week?”). Participants responded to each item on a 9-point Likert scale with anchors 1 = definitely yes/not at all/not at all, 9 = definitely no/great extent/a lot, respectively. Answers were recoded so that higher values represented greater intention to binge drink and were averaged into a single binge drinking intentions score ($\alpha = .90$).

Next drinking occasion

We used a hypothetical menu task, based on Boyland et al. (2015), to measure how many units of alcohol participants intended to consume on their next drinking occasion. We asked participants to imagine their next drinking occasion and consider what and how much they wanted to drink. They were shown a bar menu with >100 alcoholic and non-alcoholic drinks. We asked participants to imagine that the drinks on the menu were the only drinks on offer during their next drinking occasion, regardless of what venue they were in. They were instructed to indicate which drinks they would like to consume. After selecting their drink choices, they were asked to specify how many drinks of each type they would consume. They were specifically instructed to only consider drinks they would consume themselves (even if someone else would pay for them) and to disregard anything they might purchase for other people. To corroborate the cover story, the prices were blacked out. We calculated how many units of alcohol participants intended to consume based on the ABV of the drinks they selected.

Questionnaires

Approach and avoidance of alcohol questionnaire (AAAQ; McEvoy, Stritzke, French, Lang, & Ketterman, 2004)

Craving was measured with the AAAQ. This is a 14-item questionnaire is answered on a 9-point Likert scale ranging from “not at all” to “very strongly”. Items load onto three factors that measure inclinations to drink: Inclined/indulgent subscale (e.g., “I would like to have a drink or two”), obsessed/compelled subscale (e.g., “My desire to drink seems overwhelming”) resolved/regulated subscale (e.g., “I am thinking about the benefits of being sober”).

Procedure

Participants were recruited to take part in a study investigating advertising and price receptivity. They were told that they would view some advertisements, followed by a hypothetical purchasing task (the ‘next drinking occasion’ measure of drinking intentions, as described above). They were informed that some participants would see the prices of the products during the task, whereas others would not. In reality, no one saw any product prices throughout the experiment. After arrival in the lab, participants were randomly allocated to one of three experimental conditions. Participants were asked to view the five videos, followed by a bogus measure of product choice relating to one of the neutral adverts (this was to corroborate the cover story) and the three measures of drinking intentions. Whilst viewing the videos, we monitored participants’ eye movements using a Gazepoint GP3 eye-tracker (Gazepoint, Vancouver, Canada). We measured how long (in seconds) participants fixated on alcohol cues and responsibility statements in the target video. Then, they completed the same questionnaires as in Chapter 2 and a measure of craving (AAAQ). A motivation to reduce drinking score was created by averaging the TRI restraint subscale, the RTCQ contemplation and action subscales and the contemplation ladder as these scales were strongly correlated ($r = .48 - .62, ps < .001, \alpha = .81$). Then, we asked participants what they thought the aims of the study were and whether they had seen the target video prior to the experiment. Finally, they were thanked and debriefed. The study took 15-20 minutes and participants were reimbursed with a £5 shopping voucher or partial course credits.

Processing of eye-tracking data

We analysed participants’ visual attention to all alcohol cues and responsible drinking statements displayed during the target videos. Alcohol cues were defined as all occasions that an alcohol product was consumed or displayed in a glass or in packaging, and as any displays of the Heineken brand logo (there were no brand logos in the Drinkaware video). Responsible drinking

statements were defined as the link to drinkaware.co.uk and any additional text that prompted people to reduce their alcohol consumption. Only the Heineken responsibility and Drinkaware videos displayed responsible drinking statements (Heineken: “Dance more, drink slow”; Drinkaware: “Alcohol makes you pee more than water or soft drinks – pace yourself and miss less”, “Daily guidelines: Men: 3-4 units, Women: 2-3 units”, “Drink less, miss less. Drinkaware.co.uk/missless”, “For the facts about alcohol; drinkaware.co.uk”). The size and display duration of alcohol cues and responsible drinking statements varied between target videos, see Table 5.2 and Figure 5.1. Therefore, we analysed visual attention using gaze duration as a proportion of total cue display duration in each particular advert.

Prior research suggests that different types of alcohol cues (complex vs. simple; social vs. non-social) vary in the extent to which they capture the attention of alcohol consumers (Forestell, Dickter, & Young, 2012; M. A. Miller & Fillmore, 2010). In addition to generic alcohol marketing cues (brand logos, product placement), attention to the portrayal of alcohol consumption in alcohol advertising (i.e., an actor consuming an alcoholic beverage) might be a particularly important predictor of subsequent alcohol consumption, because a previous study demonstrated that participants were likely to sip alcohol in close temporal proximity to an actor sipping alcohol in a movie (Koordeman, Kuntsche, et al., 2011). Therefore, we conducted additional exploratory analyses so investigate if attention to specific types of alcohol cues would predict drinking intentions. Alcohol cues were categorised as those depicting: 1) Portrayal: occasions where a person taking a sip of the advertised product was displayed on screen; 2) Packaging: occasions where a branded bottle or can of the advertised product was displayed (excluding occasions that fit under Portrayal); 3) Glass: occasions where the advertised product was displayed in a glass (excluding occasions that fit under Portrayal); 4) Logo: occasions where the brand logo was displayed separately from the product. See supplementary materials for more information on the coding of the alcohol cues.

Table 5.1. Participant characteristics (studies 5.1 and 5.2)

Variable	Study 5.1				Study 5.2		
	Heineken responsibility (<i>n</i> = 30) M (SD)	Heineken (<i>n</i> = 30) M (SD)	Drinkaware (<i>n</i> = 30) M (SD)	Total (<i>N</i> = 90) M (SD)	Males (<i>n</i> = 17) <i>M</i> (<i>SD</i>)	Females (<i>n</i> = 45) <i>M</i> (<i>SD</i>)	Total (<i>N</i> = 62) <i>M</i> (<i>SD</i>)
Age	24.27 (7.22)	21.37 (4.21)	24.00 (9.25)	23.21 (7.24)	24.88 (7.21)	22.87 (6.87)	23.42 (6.96)
AUDIT	8.57 (4.79)	10.27 (5.66)	11.03 (4.48)	9.96 (5.05)	14.59 (5.43)	11.47 (4.62)	12.32 (5.01)
Recent alcohol consumption (last 14 days)	27.65 (23.04)	41.67 (37.82)	47.37 (32.30)	38.89 (32.38)	34.56 (15.88)	21.48 (10.67)	25.06 (13.52)
Motivation to reduce drinking	1.75 (3.79)	1.08 (3.12)	1.53 (2.98)	1.45 (3.29)	3.97 (2.80)	1.13 (2.38)	1.91 (2.79)

Table 5.2. Study 5.1. Video characteristics.

Variable	Drinkaware	Heineken responsibility	Heineken
Duration (s)	37	60	91
Display alcohol cues (% of duration)	12.43	13.18	12.94
Display responsible drinking statements (% of duration)	30.27	1.88	N/A
Number of alcohol cues	4	6	6
Number of responsible drinking statements	3	1	N/A
Size alcohol cues (cm ² * s) as a percentage of total display size	3.84	0.75	0.80
Size responsible drinking statements (cm ² * s) as a percentage of total display size	12.98	0.04	N/A

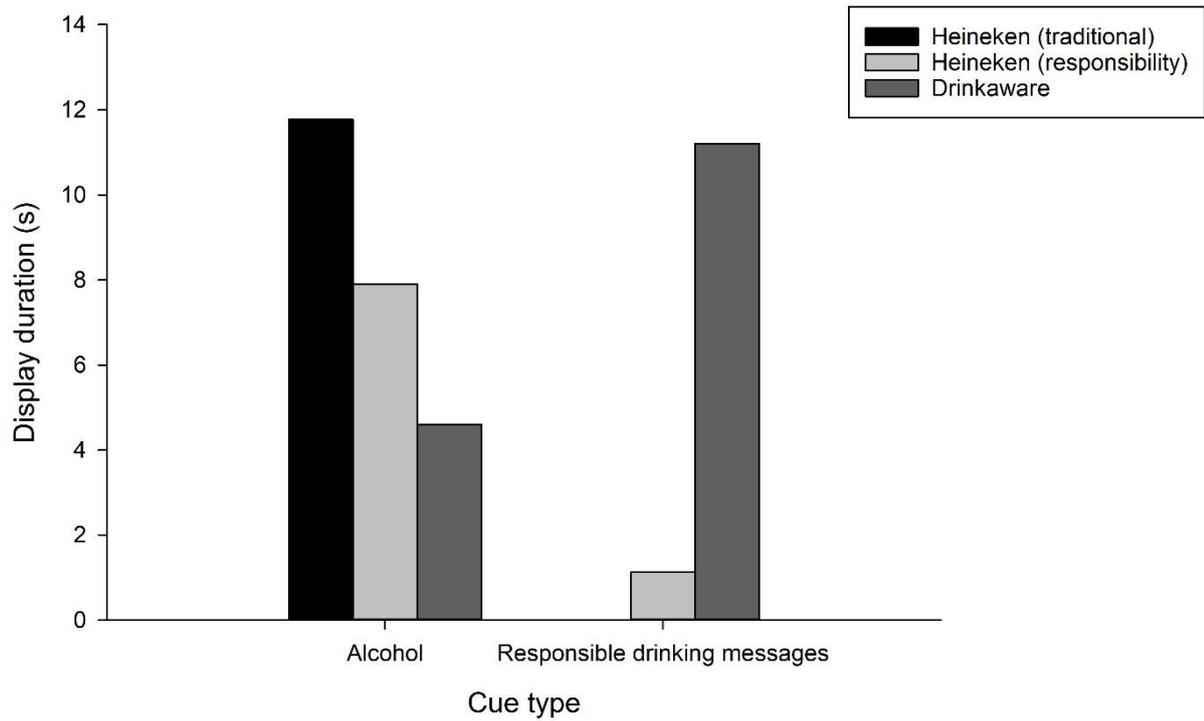


Figure 5.1. Study 5.1. Total display duration of alcohol cues and responsible drinking statements in the different video conditions. Note: Heineken advert did not display any responsible drinking statements.

5.3.2 Supplementary methods

Coding of alcohol cues (studies 5.1 and 5.2)

In both studies, alcohol cues were categorised as those depicting: 1) Portrayal: occasions where a person taking a sip of the advertised product was displayed on screen; 2) Packaging: occasions where a branded bottle or can of the advertised product was displayed (excluding occasions that fit under Portrayal); 3) Glass: occasions where the advertised product was displayed in a glass (excluding occasions that fit under Portrayal); 4) Logo: occasions where the brand logo was displayed separately from the product. To ensure that each cue was only categorized into one type of cue, packaging and glass cues that were seen as part of portrayal cues were only coded as portrayal cues and not coded as packaging/glass cues.

In study 5.1, only the Drinkaware video displayed any portrayal cues, all of which involved alcohol displayed in a glass. If the portrayal cues had instead been coded as glass cues, they would have accounted for 70% of alcohol glass display time. In study 5.2, all soda portrayal cues involved product packaging. 66% of alcohol portrayal display time involved product packaging, the remaining 34% involved products displayed in glasses. If the portrayal cues had instead been coded as packaging/glass cues, they would have accounted for 2.6% of alcohol glass display time, 8.4% of alcohol packaging display time and 15.0% of soda packaging display time.

5.3.3 Results

Participant characteristics

A MANOVA with target video condition as a between-subjects factor and age, recent alcohol consumption, AUDIT scores and motivation to reduce drinking as dependent variables revealed that the multivariate effect of condition was not statistically significant ($F(8,162) = 1.49, p = .16, \eta^2_p = .07$). Therefore, groups were well-matched.

Effect of target video condition on drinking intentions (Table 5.3)

We conducted a one-way MANCOVA with target video condition as the between-subjects factor and intended consumption at the next drinking occasion (menu task), intended consumption in the subsequent week, and intentions to binge drink in the subsequent week, as dependent variables, with age, AUDIT scores, weekly alcohol consumption and motivation to reduce drinking as covariates. The multivariate test revealed no overall effect of condition ($F(6, 158) = .47, p = .83, \eta^2_p = .02$). Inspection of the univariate tests confirmed that target video condition did not significantly affect intended consumption at the next drinking occasion ($F(2, 80) = .16, p = .85, \eta^2_p = .004$), intended consumption in the subsequent week ($F(2, 80) = 1.16, p = .32, \eta^2_p = .03$), or intentions to binge drink during the subsequent week ($F(2, 80) = .46, p = .63, \eta^2_p = .01$).

Attention to alcohol cues and responsible drinking statements (Figure 5.2)

Participants with more invalid fixations (data points with missing data from both eyes) than valid fixations were excluded from analyses due to inaccurate tracking ($n = 7$)⁸. To investigate whether participants in the different target video conditions had different viewing patterns, we conducted a one-way (video condition; Heineken responsibility, Heineken conventional, Drinkaware) ANCOVA with attention to alcohol cues (gaze duration as a percentage of cue display duration) as

⁸ Including all participants in analysis, or using more stringent exclusion criteria based on outlier analysis, did not affect the pattern of results.

the DV and age, AUDIT scores, weekly alcohol consumption and motivation to reduce drinking as covariates. Results showed that attention to alcohol cues significantly differed across target videos ($F(2, 73) = 7.55, p = .001, \eta^2_p = .17$). Post-hoc t-tests showed that participants paid more attention to alcohol cues in the Heineken conventional advert ($M = 22.61, SD = 8.65$) than in the Heineken responsibility advert ($M = 14.88, SD = 7.92, t(52) = 3.43, p = .001, d = .95$). Participants also paid significantly more attention to alcohol cues in the Drinkaware video ($M = 28.94, SD = 19.12$) than in the Heineken responsibility advert, $t(51) = 3.57, p = .001, d = 1.00$. Participants paid similar amounts of attention to alcohol cues in the Drinkaware video and in the Heineken conventional advert, $t(49) = 1.53, p = .13, d = .44$.

As the conventional Heineken advert had no responsibility statements, the following analyses were conducted only on the Heineken responsibility advert and the Drinkaware video. A cue type (alcohol, responsible drinking statement) x target video condition (Heineken responsibility, Drinkaware) repeated-measures ANCOVA with attention as a percentage of cue display time as the DV and age, AUDIT scores, weekly alcohol consumption and motivation to reduce drinking as covariates showed a non-significant main effect of cue type ($F(1, 48) = 1.86, p = .18, \eta^2_p = .04$) and a significant main effect of target video condition ($F(1, 48) = 35.43, p < .001, \eta^2_p = .43$), which were qualified by a significant interaction ($F(1, 48) = 26.66, p < .001, \eta^2_p = .36$). Post-hoc t-tests split by condition showed that participants who viewed the Drinkaware video paid more attention to responsible drinking statements ($M = 43.26, SD = 19.70$) than alcohol cues ($M = 28.94, SD = 19.12, t(24) = 4.61, p < .001, d = .92$), whereas participants who viewed the Heineken responsibility advert paid more attention to alcohol cues ($M = 14.88, SD = 7.92$) than responsible drinking statements ($M = 6.83, SD = 11.30, t(27) = 3.16, p = .004, d = .60$).

Attention to responsible drinking statements and different types of alcohol cues as correlates of drinking intentions

After controlling for participant characteristics (age, AUDIT scores, weekly alcohol

consumption and motivation to reduce drinking), in the sample as a whole there were no significant correlations between attention to alcohol cues (collapsed across conditions) and intended consumption at the next drinking occasion ($r = .01, p = .90$), intended consumption in the subsequent week ($r = -.12, p = .30$), and intentions to binge drink during the subsequent week ($r = -.08, p = .45$). Across the advertisements that displayed responsible drinking statements (Drinkaware, Heineken responsibility; $n = 53$), there were no significant correlations between attention to responsible drinking statements and intended consumption at the next drinking occasion ($r = .05, p = .73$), intended consumption in the subsequent week ($r = -.03, p = .83$), and intentions to binge drink during the subsequent week ($r = -.10, p = .46$).

Then, we investigated whether attention to various alcohol cues and responsible drinking statements were correlated with drinking intentions within the three advertising conditions. As shown in Table 5.4, there were no significant correlations between attention to alcohol cues or responsible drinking statements and drinking intentions in any of the advertising conditions.

Table 5.3. Study 5.1. The effect of video condition on three measures of drinking intentions.

Measure of drinking intentions	Video condition		
	Heineken responsibility	Heineken	Drinkaware
	M (SD)	M (SD)	M (SD)
Next drinking occasion (UK units)	15.99 (21.14)	18.35 (19.71)	16.49 (18.91)
Next week (UK units)	13.23 (9.76)	15.23 (15.07)	17.60 (13.64)
Binge drinking intentions	3.43 (2.27)	3.93 (2.50)	4.71 (2.27)

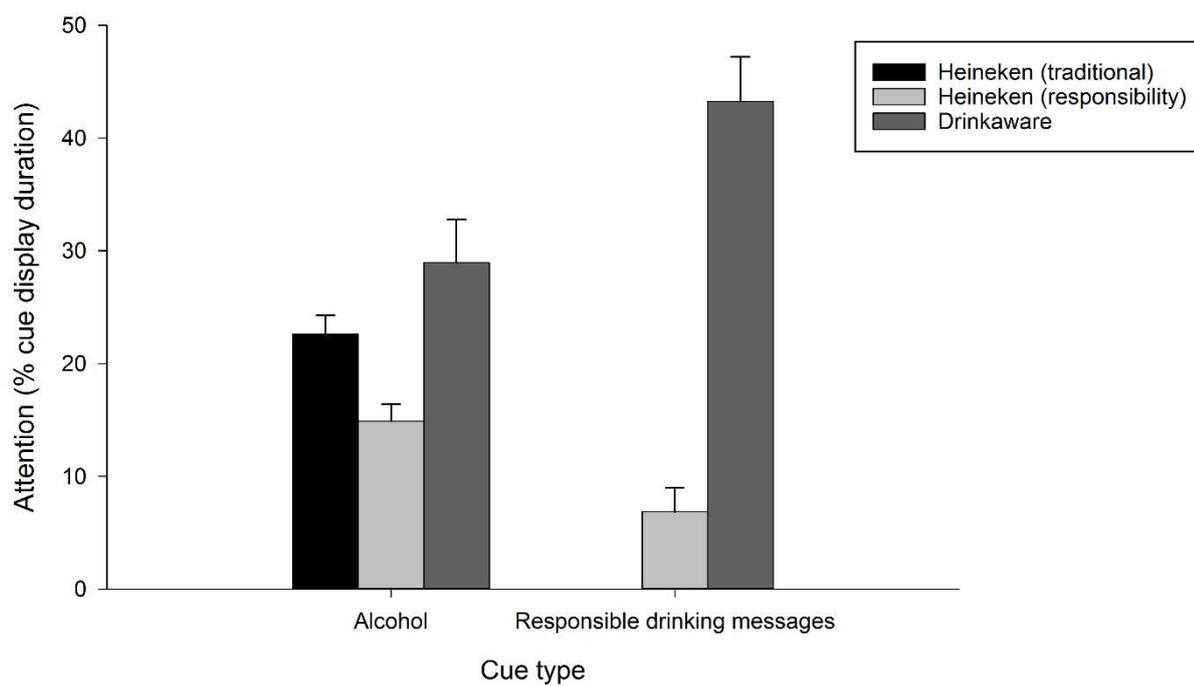


Figure 5.2. Study 5.1. Visual attention to alcohol cues and responsible drinking messages in the different video conditions. Bars represent gaze duration as a percentage of total cue display time. Error bars indicate SEM. Note: Traditional Heineken advert did not display any responsible drinking messages.

Table 5.4. Study 5.1. Correlations between attention to alcohol, health and various alcohol marketing cues (logos, packaging, glasses, portrayal) and three measures of drinking intentions (intended consumption at the next occasion, during the next week, and next week intentions to binge drink), across the three video conditions.

	Video condition								
	Heineken responsibility (n = 28)			Heineken (n = 26)			Drinkaware (n = 25)		
	Next	Next	Binge	Next	Next	Binge	Next	Next	Binge
Visual attention to:	occasion (<i>r</i>)	week (<i>r</i>)	drinking (<i>r</i>)	occasion (<i>r</i>)	week (<i>r</i>)	drinking (<i>r</i>)	occasion (<i>r</i>)	week (<i>r</i>)	drinking (<i>r</i>)
Alcohol cues	.10	.11	.14	.25	-.01	-.24	-.11	-.14	-.04
Responsible drinking statements	.13	-.05	-.04	N/A	N/A	N/A	.05	-.03	-.25
Alcohol packaging	-.10	-.17	-.11	.31	-.04	.04	N/A	N/A	N/A
Alcohol logos	.22	.32 ⁺	.17	.12	.02	-.32	N/A	N/A	N/A
Alcohol glasses	N/A	N/A	N/A	N/A	N/A	N/A	-.12	-.25	-.10
Alcohol portrayal	N/A	N/A	N/A	N/A	N/A	N/A	-.09	-.04	.13

Note: ⁺ $p < .10$

5.3.4 Discussion

The primary aim of this study was to measure alcohol consumers' attention to alcohol cues and responsible drinking statements in alcohol-related public health campaigns and alcohol advertising with a focus on responsible drinking, and investigate how this is related to drinking intentions. Our results showed that attention to alcohol cues significantly differed across target videos, but individual differences in attention were not correlated with drinking intentions. Participants who watched the Drinkaware video (alcohol-related public health campaign) and the traditional Heineken advert spent a similar amount of time viewing alcohol cues (proportional to their display duration), and both paid more attention to alcohol cues compared to participants who viewed the Heineken advert with a responsible drinking message. In addition, participants who viewed the Drinkaware video paid more attention to the responsible drinking statements than those who viewed the Heineken responsibility advert. We also found that participants who viewed the Drinkaware advert attended more to the responsible drinking statements than the alcohol cues, whereas the opposite was true for those who viewed the Heineken responsibility advert. All of these differences in attention were roughly proportional to differences in display duration and display size between the videos / adverts. While we controlled for display duration in our analyses, we were not able to control for differences in size. Therefore, our findings are likely to be at least partially attributable to differences between videos / adverts in the visual salience of the alcohol cues/responsible drinking statements that they depict.

In the context of these marked differences between videos / adverts, it is important to note that participants who viewed the Drinkaware video and the traditional Heineken advert did not differ in their attention allocation to alcohol cues, even though alcohol cues were more prominent in the Drinkaware video than in the Heineken advert (this is evident in Table 2). Similarly, participants who viewed the Heineken responsibility advert attended less to alcohol

cues than participants who viewed the traditional Heineken advert, even though alcohol cues were similarly prominent in both adverts. The overall picture is that alcohol cues appear to be less ‘attention grabbing’ when they are displayed in a “responsible drinking” context, whereas responsible drinking statements are more ‘attention grabbing’ in this context, but only in a public health campaign rather than a branded advert. Our findings are consistent with Thomsen and Fulton (2007), who demonstrated that responsible drinking statements attracted more attention if they were a prominent part of the advert’s message. Those authors also did not control for the size of components of the advert, so it is possible that alcohol adverts that focussed on responsible drinking had larger and more prominent responsible drinking messages, which could have accounted for the increase in attention. In line with K. C. Smith et al. (2014), our finding that alcohol cues attracted more attention than responsible drinking statements in the alcohol advert with a responsible drinking message suggests that the primary aim of this type of advertisement may be to promote the brand rather than encourage responsible drinking. Our findings are not in line with findings reported by Moss et al. (2015), who found that participants paid less attention to responsible drinking statements than positive and negative alcohol imagery in responsible drinking posters. Our findings also do not support their hypothesis that viewing patterns might account for differences in drinking behaviour, as we found no significant relationships between visual attention and drinking intentions. However, Moss et al. (2015) did not control for differences in size between the alcohol images and the responsible drinking messages in the posters. The findings from the current study suggest that larger alcohol cues and responsible drinking messages also attracted more attention, so it is possible that size differences might have partially accounted for the findings reported by Moss et al. (2015).

We found no evidence that exposure to public health campaigns or alcohol adverts that emphasize responsible drinking affected participants’ drinking intentions compared to

traditional alcohol adverts. At face value, these findings contrast with recent findings from Stautz and Marteau (2016), who demonstrated that participants had a lower urge to drink after watching responsible drinking adverts. However, there are a number of important differences between the studies. In their study, Stautz and Marteau (2016) measured immediate urge to drink (right now), whereas we measured more distal drinking intentions (next week/drinking occasion). Stautz and Marteau also exposed participants to multiple public health campaigns with a variety of themes, whereas we showed participants only one public health campaign. It is likely that different public health campaigns have differential effects on drinking-related outcome measures, which might account for the discrepancy in results. Additionally, a single exposure to an alcohol-related warning message might reduce the urge to drink without being sufficient to influence participants' intentions to drink; instead, effects on drinking intentions might only emerge after sustained exposure to the warning message. For example, attitudes towards smoking became more negative with increasing exposure to an anti-tobacco print advert (Reinhard, Schindler, Raabe, Stahlberg, & Messner, 2014). Additionally, we exposed participants to a commercial that was commissioned by Drinkaware, an industry-sponsored NGO, whereas Stautz and Marteau primarily exposed participants to independent campaigns. It is possible that independent campaigns are more persuasive than campaigns from an industry-sponsored NGO, due to potential conflicts of interest. Finally, as we did not include a control condition with a non-alcohol advert, we cannot draw any conclusions about the (in)effectiveness of the specific videos that were used in the present study.

The aim of study 5.2 was to investigate how attention allocation to alcohol cues in alcohol advertising is associated with drinking behaviour, as we were not able to investigate this in study 5.1. We made a number of methodological changes that enabled us to conduct a test of the hypothesis that attention to responsible drinking statements within alcohol adverts would be negatively correlated with the amount of alcohol that participants consumed in the

laboratory, whereas attention to alcohol cues would be positively correlated with alcohol consumption in the lab. We changed the alcohol-related outcome measure from drinking intentions to actual alcohol consumption because alcohol advertisements have been shown to increase alcohol consumption immediately after exposure (Stautz et al., 2016). The most important methodological change was the switch from a between-subjects design (in study 5.1, participants were exposed to only one type of video / advert) to a within-subjects design in which participants were exposed to a number of different adverts for alcoholic and non-alcoholic drinks. This methodological change meant that we were unable to investigate the causal influence of different types of alcohol adverts vs. public health campaigns on immediate alcohol consumption. However, the use of multiple different adverts enabled us to clearly distinguish attention to different types of alcohol cues that were depicted in adverts (portrayal, packaging, glass, logo, responsible drinking statements), and investigate the relationship between attention to each of these components and subsequent drinking behaviour.

5.4 Study 5.2

The purpose of this study was to measure participants' visual attention to various alcohol cues and responsible drinking statements in alcohol advertising and investigate how this predicts alcohol consumption in the laboratory. Therefore, we conducted a cross-sectional study to investigate the relation between attention to these specific alcohol cues and responsible drinking statements and drinking behaviour. To investigate how attention to different types of alcohol cues in TV alcohol advertising predicted subsequent alcohol consumption, we asked participants to complete a bogus taste test shortly after viewing alcohol and soda advertisements. We included soda advertisements to investigate whether the association between attention allocation and alcohol consumption was specific to alcohol-related cues or if it could be explained by increased attention to appetitive drinks-related cues in general. We

correlated alcohol consumption during the taste test with attention to subtypes of alcohol and soda cues (portrayal of consumption, packaging, drinks glasses, and brand logos) and responsible drinking statements in alcohol advertising. Our primary hypothesis was that greater attention to alcohol cues would predict greater alcohol consumption, and increased attention to responsible drinking statements would predict reduced consumption. Additionally, our secondary hypothesis was that out of the four different types of alcohol cues, alcohol portrayal would be the strongest predictor of alcohol consumption, on the basis of a previous finding that participants were likely to sip alcohol in close temporal proximity to an actor sipping alcohol in a movie (Koordeman, Kuntsche, et al., 2011). As study 5.1 demonstrated that alcohol cues in alcohol advertising attracted more attention than responsible drinking messages, study 5.2 also investigated whether this pattern would be consistently seen across multiple adverts.

5.4.1 Method

Participants

Sixty-two participants (73% female) took part in this study, which employed a within-subjects design (see Table 1). Participants were recruited via online advertisements circulated among students and staff at the University of Liverpool. Participants were eligible to take part if they were aged over 18, drank at least 10 UK units/week (to capture social alcohol consumers who drank regularly) and liked apple cider and cola (as the experiment involved consuming these drinks). The study received ethical approval from the University of Liverpool Research Ethics Committee. Testing took place between September 2015 and February 2016. Participants could take part in both study 5.1 and study 5.2 under the condition that the testing sessions were at least seven days apart. Six participants participated in both studies.

Cover story

At the start of the study, participants were told the following cover story: *“We are interested in how alcohol advertising affects how much we like/dislike the taste of alcoholic drinks. During the experiment you will be asked to view alcohol and soft drinks advertisements, while we measure your eye-movements using an eye-tracking camera. After that you will be asked to taste and rate some drinks that you have seen the advertisement for. One group of participants will be shown the brands of the drinks in the taste test, whereas the other group will not receive this information.”* In reality, there was no manipulation and no participants were told which brands were used in the taste test.

Eye-tracking task

Participants were asked to view a series of advertisements as if they were watching them in an advert break on television. During the eye-tracking task, participants viewed 8 alcohol (4 cider, 3 beer, 1 spirits) and 8 soda advertisements. All adverts had been aired between 2012 and 2015. The order of presentation was randomised. Each alcohol advert included a link to the Drinkaware website and an optional responsibility statement (“Drinkaware Brand Guidelines For Partners,” 2009). None of the soda adverts showed a responsibility statement. Whilst viewing the adverts, we monitored participants’ eye movements using a Gazepoint GP3 eye-tracker (Gazepoint, Vancouver, Canada). We measured how long (in seconds) participants fixated on alcohol/soda cues and responsibility statements. As in study 5.1, we differentiated between four different types of alcohol (and soda) cues: 1) Portrayal: occasions where a person taking a sip of the advertised product was displayed on screen; 2) Packaging: occasions where a branded bottle or can of the advertised product was displayed (excluding occasions that fit under Portrayal); 3) Glass: occasions where the advertised product was displayed in a glass (excluding occasions that fit under Portrayal);

4) Logo: occasions where the brand logo was displayed separately from the product. As in study 5.1, cues varied considerably in display duration (see Figure 5.3). To control for the variance in display duration, attention to each type of cue was defined as a percentage of total cue display duration in the different advert types (alcohol, soda).

Taste test

Ad libitum alcohol consumption was measured under the guise of a taste test (A. Jones et al., 2016). Participants were given 2 glasses of Bulmers apple cider (440ml total) and 2 glasses of Pepsi cola (440 ml total). The glasses were marked with numbers 1 to 4, and participants were not informed what brand was contained in each glass. They were asked to taste and rate each drink on eight attributes (e.g., smoothness, sweetness). Each participant was given exactly 10 minutes to complete this task, after which the experimenter measured how much liquid was left in each glass. An alcohol consumption score was created by dividing cider consumption by total consumption (cider + cola consumption), resulting in a measure of alcohol consumption as a percentage of total volume consumed.

Procedure

After providing informed consent, participants completed the eye-tracking task, followed by the taste test. After this, participants completed the same questionnaire battery as administered in study 5.1. As in study 5.1, a motivation to reduce drinking score was created by averaging the TRI restraint subscale, the RTCQ contemplation and action subscales and the contemplation ladder (because these scales were highly correlated, $r = .53 - .80$, $ps < .001$). We measured familiarity with the Drinkaware website with a single multiple choice question that asked which URL was displayed in each advert (options: drinkaware.co.uk, alcoholfacts.co.uk, alcoholaware.co.uk, drinkfacts.co.uk; displayed in a random order). We also asked whether

participants were aware of the website before the study, whether they had ever visited the website and, if so, how much they liked it (100mm VAS scale). Additionally, we used a single multiple choice question to ask about the content on drinkaware.co.uk (options: “Information about alcohol units”, “Advertising for different alcohol brands”, “Tips on reducing your drinking”, “Cocktail recipes”, displayed in a random order; participants were instructed to select all that apply). At the end of the study, we asked participants to write down what they thought the aims of the study were and whether they thought the real purpose of the taste test was to measure their alcohol consumption (yes/no). Finally, participants were thanked and debriefed. Participants received study credits or a £5 shopping voucher.

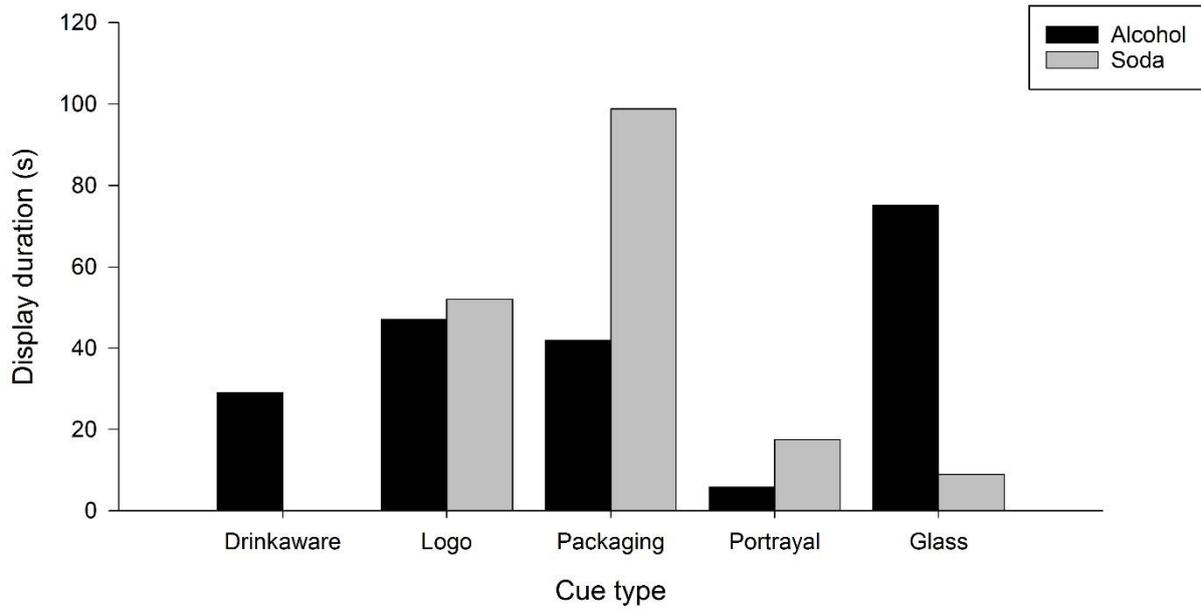


Figure 5.3. Total display duration in seconds of responsible drinking statements (Drinkaware website; alcohol adverts only), and Brand, Packaging, Portrayal, and Glass cues in alcohol and soda adverts.

5.4.2 Results

Viewing patterns (figure 5.4)

Participants with more invalid fixations than valid fixations were excluded from analyses due to inaccurate tracking ($n = 4$)⁹. Participants spent 0.19s ($SD = .05$) in total looking at the responsible drinking statements over the course of the 8 alcohol advertisements¹⁰ ($M = .02$ s per advert, $SD = .04$), which is equivalent to 0.65% of the total amount of time that the statements were displayed for (total display time = 29.01s; $M = 3.63$ s per advert, $SD = 1.29$). A one-way (cue / statement type: responsible drinking statements, portrayal cues, packaging cues, glass cues, logo cues) repeated measures ANOVA revealed a significant main effect on attention (as a proportion of cue display time; $F(4,54) = 63.79$, $p < .001$, $\eta^2_p = .83$). Bonferroni corrected post-hoc comparisons showed that participants paid significantly less attention to the responsibility statements than any of the alcohol cues (all $ps < .001$). Additionally, attention to alcohol portrayal cues did not differ significantly from attention to any other alcohol cue (all $ps > .38$). All other comparisons between alcohol cues were significant (all $ps < .004$).

A drink type (alcohol, soda) \times cue type (portrayal, packaging, glass, logo) repeated measures ANOVA was conducted to compare viewing patterns of brand-related cues between alcohol and soda advertisements. This revealed a significant main effect of drink type ($F(1,57) = 13.72$, $p < .001$, $\eta^2_p = .19$) and cue type ($F(3,55) = 20.33$, $p < .001$, $\eta^2_p = .53$), which were qualified by a significant drink type \times cue type interaction ($F(3,55) = 26.07$, $p < .001$, $\eta^2_p = .59$). Bonferroni corrected post-hoc comparisons showed that participants spent a higher percentage of display time attending to alcohol than soda Brand, Packaging, and Glass cues (all $ps < .001$). The opposite was found for Portrayal cues, where participants spent a higher

⁹ Including all participants in analysis, or using more stringent exclusion criteria based on outlier analysis, did not affect the pattern of results.

¹⁰ Attention to the responsible drinking statement did not differ over successive trials, see supplementary materials.

percentage of display time attending to Portrayal cues in soda adverts compared to alcohol adverts ($p < .001$).

***Ad libitum* alcohol consumption**

On average, participants consumed similar amounts of cider ($M = 158.31$, $SD = 117.31$) and cola ($M = 156.37$, $SD = 100.65$, paired samples t-test $t(61) = .16$, $p = .88$).

In an initial analysis, we used a stepwise linear regression (backward elimination procedure) with participant characteristics (age, gender, AUDIT scores, weekly alcohol consumption and motivation to reduce drinking) and attention to the responsible drinking statement, alcohol cues (sum of all individual alcohol cues), and soda cues (sum of all individual soda cues) as predictors of ad-lib alcohol consumption. As shown in Table 5.5, age ($\beta = .27$, $t(54) = 2.24$, $p = .03$) and gender ($\beta = -.27$, $t(54) = 2.24$, $p = .03$) significantly predicted alcohol consumption: Male participants and older participants consumed more alcohol during the taste test. The other participant characteristics did not significantly predict alcohol consumption. Most importantly, attention to the responsibility statements, alcohol cues, or soda cues did not significantly predict alcohol consumption.

In order to test our second hypothesis that individual differences in attention to different types of alcohol cues would predict alcohol consumption, we conducted a second stepwise linear regression. We included participant characteristics, attention to the responsible drinking statements, and attention to the 4 different types of alcohol and soda cues (packaging, glass, brand presence, and sipping portrayal) as predictors of alcohol consumption. Similarly to the general model, age and gender were significant predictors of alcohol consumption, see Table 5.6. Regarding the attention variables, only attention to alcohol portrayal emerged as a significant predictor ($\beta = .25$, $t(54) = 2.09$, $p = .04$): Increased attention to the portrayal of alcohol consumption was predictive of increased alcohol consumption during the taste test.

Awareness of Drinkaware website

The majority of participants (91.9%, n = 57) correctly identified drinkaware.co.uk as the website displayed in alcohol advertising. 50 of those (87.7%) reported being aware of the website before taking part in the study.

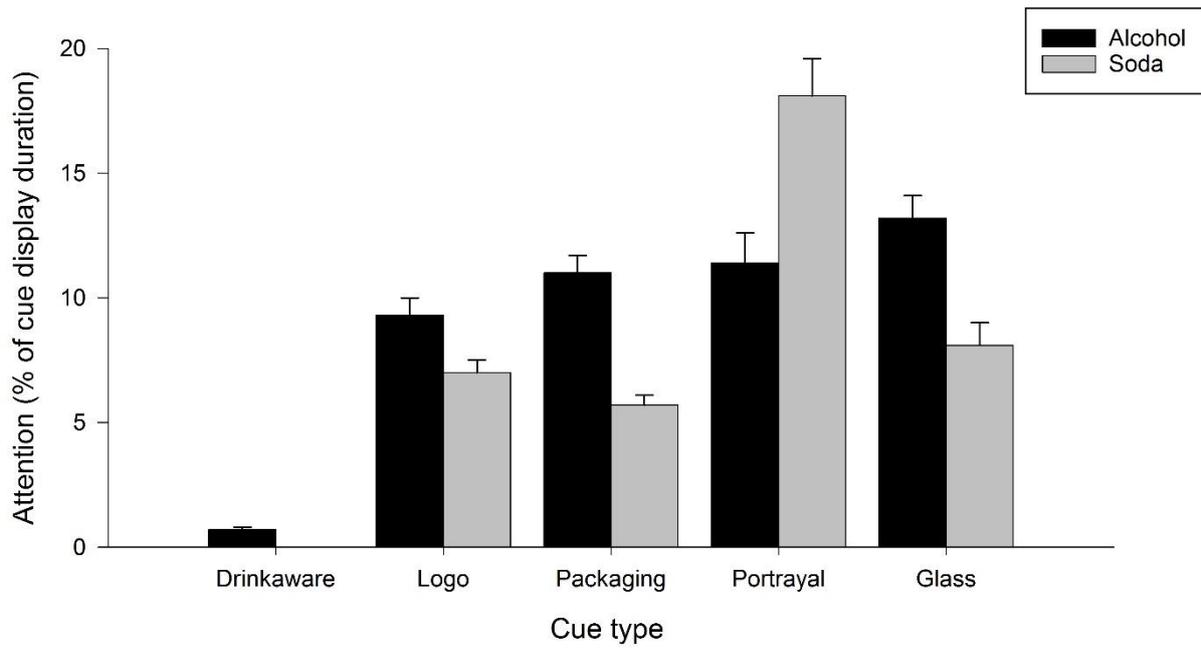


Figure 5.4. Viewing patterns for alcohol and soda advertisements, split by attention to the Drinkaware (alcohol adverts only), Brand, Packaging, Portrayal, and Glass cues. Bars represent gaze duration as a percentage of total cue display time. Error bars indicate SEM.

Table 5.5. Study 5.2. Stepwise linear regression analysis (backward elimination) with age, gender, AUDIT scores, weekly alcohol consumption, motivation to reduce drinking, and attention to drinkaware messages, alcohol cues and soda cues as predictors of ad-lib alcohol consumption.

Variable	Ad-lib alcohol consumption
Age (β)	.28*
Gender (β)	-.29*
R^2	.18
$F(2,55)$	5.96**
<i>Excluded variables</i>	
AUDIT (β)	.05
Weekly alcohol consumption (β)	-.01
Motivation to reduce drinking (β)	.04
Attention to drinkaware message (β)	.06
Attention to alcohol cues (β)	.12
Attention to soda cues (β)	.10

Note: * $p < .05$, ** $p < .10$

Table 5.6. Study 5.2. Stepwise linear regression analysis (backward elimination) with age, gender, AUDIT scores, weekly alcohol consumption, motivation to reduce drinking and attention to alcohol and soft drink cues (drinkaware, bottle, brand, glass, and portrayal) as predictors of ad-lib alcohol consumption.

Variable	Ad-lib alcohol consumption
Age (β)	.27*
Gender (β)	-.27*
Attention to alcohol portrayal (β)	.25*
R^2	.24
$F(3,54)$	5.67**
<i>Excluded variables</i>	
AUDIT (β)	.03
Weekly alcohol consumption (β)	.01
Motivation to reduce drinking (β)	.06
Attention to alcohol packaging (β)	.01
Attention to alcohol glass (β)	-.15
Attention to alcohol brand (β)	-.11
Attention to drinkaware message (β)	-.02
Attention to soda portrayal (β)	.01
Attention to soda packaging (β)	-.09
Attention to soda glass (β)	-.15
Attention to soda brand (β)	-.22

Note: * $p < .05$, ** $p < .10$

5.4.3 Discussion

We measured alcohol consumers' attention to responsible drinking statements and different types of alcohol cues in alcohol advertisements, and investigated how this was associated with their subsequent *ad libitum* alcohol consumption in a laboratory setting. Results showed that attention to the responsible drinking statements or general alcohol cues did not significantly predict proximal alcohol consumption. However, analysis separated by alcohol cue type (alcohol packaging, alcohol drinks in a glass, portrayal of alcohol consumption, and brand logos) revealed that attention to the portrayal of alcohol consumption in adverts significantly predicted subsequent alcohol consumption: Participants who attended to alcohol portrayal longer, drank more alcohol during the taste test. There was no evidence that attention to any of the other alcohol cues predicted immediate alcohol consumption. Additionally, we found that participants paid minimal attention to the responsible drinking statement in alcohol advertisements (~1% of total display time), but most were still aware that the message referred to the Drinkaware website (91.9%).

Our findings are in line with previous research which showed that, when watching a movie, participants were more likely to drink alcohol in close temporal proximity to actors consuming alcohol, than at times when actors were not drinking alcohol (Koordeman, Kuntsche, et al., 2011), which accounted for increased total immediate alcohol consumption in this group compared to another group of participants who did not see any alcohol portrayals (Koordeman, Anschutz, van Baaren, et al., 2011). However, a meta-analysis showed no overall effect of alcohol portrayal on immediate alcohol consumption (Stautz et al., 2016), possibly due to a lack of statistical power. The findings by Koordeman, Kuntsche, et al. (2011) might be understood in the context of social mimicry effects on alcohol consumption. For example, Larsen, Engels, Souren, Granic, and Overbeek (2010) showed that participants were more likely to consume alcohol in close temporal proximity to their drinking partner. Therefore,

increased attention to alcohol portrayal in advertising may affect alcohol consumption by increasing mimicry. However, Koordeman, Kuntsche, et al. (2011) did not investigate attention allocation to alcohol portrayal and there has been no research on the relation between visual attention and social mimicry, so it is unclear whether greater attention also results in greater mimicry. As this is a correlational study, it is also possible that a confounding factor (such as desire to consume alcohol) influenced both attention to alcohol portrayal and alcohol consumption in the laboratory and that attention to alcohol portrayal does not influence ad-lib alcohol consumption. Future research should investigate whether advertisements that portray alcohol consumption increase immediate alcohol consumption to a greater extent than other alcohol advertisements. Additionally, it should be studied whether participants also mimic sipping behaviour in advertisements, as they do with sipping behaviour in films.

5.5 General discussion

In the studies presented here we measured visual attention to alcohol and responsible drinking statements in alcohol advertising and public health campaigns and investigated how this related to drinking intentions and drinking behaviour in the lab. Both studies demonstrated that alcohol cues in alcohol adverts attract more attention than responsible drinking statements, even in a branded advertisement with a focus on responsible drinking. This finding is in line with previous research. The studies in Chapter 2 and Thomsen and Fulton (2007) demonstrated that little attention is paid to responsible drinking statements on alcohol packaging and in print alcohol advertising, respectively. However, both studies found that participants paid some attention to the messages (~7% of total viewing time in both studies), which is in contrast to findings from study 2 that demonstrated that participants paid minimal attention to the responsibility statement if it was embedded in alcohol advertising (0.19s over the course of 8 alcohol adverts; 0.65% of display duration). However, findings from study 5.1 demonstrated

that responsible drinking messages attracted more attention if they were embedded in a public health campaign or an alcohol advertisement that emphasized responsible drinking (43% and 7% of display duration, respectively). It is possible that responsible drinking statements are, by design, more visually salient in public health campaigns/adverts that emphasize responsible drinking and that this accounts for the increase in attention. Despite the lack of attention to the responsible drinking statement, message awareness in study 5.2 was high. Therefore, it is likely that participants ignored the message (which was the same in each alcohol advert), because it did not provide them with any additional information. Additionally, in contrast to print advertising and packaging, imagery in TV advertising is constantly moving. So, participants need to actively prioritise attention to the cues they are interested in, because they are only displayed for a limited amount of time, whereas there are no time constraints when viewing print advertising or packaging.

We found no evidence that attention to responsible drinking statements or alcohol cues in general predicted drinking intentions or alcohol consumption in the lab. However, in study 5.2 we demonstrated that visual attention to portrayals of alcohol consumption predicted ad-lib alcohol consumption. Future research should investigate if removal of portrayals of alcohol consumption from alcohol advertising and public health campaigns moderates their influence on drinking intentions and behaviour.

These studies had some limitations. First, we did not use a non-alcohol advert as a control condition in study 5.1. Therefore, we do not know whether the public health campaign and alcohol advert with a focus on responsible drinking increased participants' intentions to drink to the same extent as the alcohol advert, or whether none of the videos affected participants' drinking intentions. Additionally, it was not possible to match the adverts in the video conditions on number, size and duration of alcohol cues and responsible drinking statements. Ideally, the adverts should show the same amount of alcohol/responsible drinking

cues and only differ in the persuasive message, in order to make a fair comparison. Second, study 5.2 was an observational within-subjects study in which all participants saw the same advertisements, so we cannot draw any conclusions regarding the effect of exposure to (specific) alcohol advertisements on immediate alcohol consumption. Third, we used a limited number of advertisements and public health campaigns in both studies, which opens up the possibility that the adverts that we used were not representative of other alcohol adverts or public health campaigns. This is especially important in study 5.1, as we only exposed participants to one advert/public health campaign per condition. It is therefore possible that the specific (non-)branded public health campaigns that we used were ineffective and that other adverts / campaigns would have resulted in significant differences in drinking intentions. The videos that we used in study 5.1 did not portray all subtypes of alcohol cues (for example, the public health campaign did not depict any specific alcohol brands, and the conventional alcohol advert did not portray people drinking), therefore we were unable to investigate the relationship between attention to all different subtypes of alcohol-related cues and alcohol-related outcomes in this study. Future research should investigate variability in public health campaigns and how specific themes and cue types affect drinking intentions. Fourth, because the literature on attention to different alcohol cue types was limited to still, pictorial stimuli, we categorized alcohol cues based on visual differences in product presentation. The categories were mutually exclusive and all display occasions of the alcohol product and responsible drinking statements were accounted for in one of the categories. However, it is possible that a different classification of alcohol cues (for example, based on implied alcohol outcomes) would result in different findings. Fifth, in both studies we assessed individual differences such as recent alcohol consumption and motivation to reduce drinking after (rather than before) participants had been exposed to the alcohol-related adverts/public health campaign. Therefore, it is possible that participants' responses to the questionnaires were affected by the videos that they

had seen. However, in study 5.1, we found no significant differences between groups on these variables, suggesting that exposure to the different videos did not robustly influence these variables. Finally, both male and female participants took part in study 5.2 but we did not include female participants in study 5.1 because we considered men to be the target audience for the advertisements that were used in study 5.1 (whereas the advertisements used in study 5.2 appeared to be aimed at a broader range of alcohol consumers, both men and women). This means that we cannot directly compare the findings from studies 5.1 and 5.2.

Our studies also had strengths. In study 5.1, we used traditional alcohol advertisements as a control in order to directly compare the effect of ambiguous alcohol advertising (alcohol advert that emphasizes responsible drinking) to traditional advertising. In study 5.2, we used advertisements for a variety of alcoholic drink types (cider, beer, and spirits) and brands, so we could capture attention to a range of alcohol cues. We used soda advertisements as control stimuli. This allows us to conclude that the association between attention to portrayal and immediate alcohol consumption is specific to alcohol advertisements and not due to viewing actors drinking any type of beverage. In addition, in both studies we defined attention as a percentage of total cue display time, which allowed us to control for differences in display time between the alcohol/soda cues and responsibility statements.

To conclude, these studies demonstrated that responsible drinking statements in alcohol advertising attracted limited attention, but when viewing a public health campaign that was not associated with alcohol brands, participants attended more to the responsible drinking statements than to alcohol cues. However, individual differences in attention to responsible drinking statements did not predict drinking intentions or alcohol consumption in the laboratory. Out of all the alcohol cues, only attention to alcohol portrayal predicted ad-lib alcohol consumption, but it did not predict drinking intentions. Future research should investigate how responsible drinking statements can be improved to attract more attention and

prompt participants to intend to drink less or actually drink less alcohol. Additionally, it is important to study whether removal of alcohol portrayal from alcohol advertising and public health campaigns would affect drinking behaviour.

Chapter 6

Evaluations of branded and non-branded responsible drinking campaigns and warning labels on alcohol packaging: A focus-group study

The studies described in Chapters Two and Five demonstrated that exposure to current alcohol warning labels and public health campaigns did not significantly affect drinking intentions. This chapter describes a focus group study that was designed to gather in-depth information about alcohol consumers' perceptions of current responsible drinking messages (on alcohol packaging and in televised campaigns) and to investigate recommendations for responsible drinking messages that might be more persuasive to regular alcohol consumers. We found that participants did not consider current warning labels and responsible drinking campaigns to be personally relevant and they reported mistrust of the message source. Participants suggested that shocking messages that communicate long-term and short-term adverse outcomes from alcohol to themselves and people around them would be more persuasive to them. It might be more effective to use warning messages that are personally relevant for the intended audience and provide information they consider to be important in order to reduce drinking.

Contributions: I designed the study, which was approved by Matt Field (primary supervisor). I collected and analysed the data. Natasha Clarke (member of research group) assisted with the data collection and Danielle Reaves (member of research group) checked the coding. Matt Field and Eric Robinson (second supervisor) gave comments on the chapter.

6.1 Abstract

Alcohol warning labels and public health campaigns are widely used by governments in an attempt to reduce alcohol (over)consumption and associated harm. There is little evidence that warning labels and public health campaigns reduce alcohol consumption, which might be due to message content and the context in which responsible drinking messages are communicated (i.e., in unison with alcohol marketing or independently). In this study, we used focus groups ($N = 13$) to investigate subjective evaluations of current UK warning labels on alcohol packaging, public health campaigns and alcohol advertisements that focus on responsible drinking. We also aimed to collect suggestions for alternative responsibility messages that would be more persuasive. Thematic analysis identified six themes that were relevant to the study aims: Scepticism towards (1) current warning labels and (2) public health campaigns/adverts with a focus on responsible drinking, (3) mistrust of the message source and content, (4) the importance of shock value, (5) the impact of potential harm to others versus harm to self, and (6) the importance of communicating both short-term and long-term adverse outcomes from alcohol. Specific recommendations to improve the effectiveness of responsible drinking messages on alcohol packaging/in public health campaigns included messages that communicate adverse health outcomes, adverse short-term outcomes (such as hangovers and violence), and adverse effects of alcohol on other people. These suggestions are in line with previous research that shows that alcohol consumers are concerned about these negative alcohol outcomes, and their effect on alcohol consumption should be investigated in future research.

6.2 Introduction

Alcohol warning labels on packaging and alcohol public health campaigns are widely used by governments in an attempt to reduce alcohol consumption and improve public health (for example Change4Life; Public Health England, 2012). Alcohol warning labels increase message awareness, but have a limited effect on behaviour (Scholes-Balog, Heerde, & Hemphill, 2012; Stockwell, 2006; Claire Wilkinson & Room, 2009). Research on the effectiveness of public health campaigns is mixed. A recent experiment demonstrated that exposure to six televised public health campaigns reduced young adults' urge to drink, compared to alcohol promoting adverts and control adverts (Stautz & Marteau, 2016). This effect was mediated by increased negative affect after watching the responsibility adverts. However, other researchers observed limited to no effect of responsible drinking messages on drinking behaviour, or even adverse effects (see Agostinelli & Grube, 2002 for a review). For example, recent experimental studies showed that exposure to public health campaigns increased ad-libitum alcohol consumption (Moss et al., 2015) and decreased negative attitudes towards alcohol (K. G. Brown et al., 2015). Some researchers suggest that the limited effectiveness of responsible drinking messages is due to the design and content of the current messages, as they generally provide little information about alcohol-related harms and provide no clear goals for behaviour change (Al-hamdani, 2014; Martin-Moreno et al., 2013; Claire Wilkinson & Room, 2009).

Several types of responsible drinking messages have been compared in the scientific literature. For example, research demonstrates that distressing warning messages (i.e., fear appeals) elicit defensive avoidance responses (S. L. Brown & Locker, 2009; S. L. Brown & Richardson, 2012), reducing their persuasive potential (see Ruiter, Kessels, Peters, & Kok, 2014 for a review of sixty years of fear appeal research). Indeed, one study demonstrated that posters with a moderate drinking message ("It's ok to have a drink. Just don't overdo it.")

increased participants' intentions to drink moderately if they elicited positive emotions such as happiness and love, whereas negative emotions in response to the posters (shame, guilt) were not predictive of intentions to drink responsibly (Previte, Russell-Bennett, & Parkinson, 2015). However, an increase in positive emotions might not result in a reduction in alcohol consumption, as another study showed that participants were more likely to choose alcohol products that displayed positively framed warning labels than those that had negatively framed labels (Jarvis & Pettigrew, 2013).

Other research suggests that message effectiveness depends on target group characteristics. For example, findings by Quick and Bates (2010) suggest that gain-framed messages (messages that communicate the benefits of not drinking) would be most beneficial for individuals who consider themselves to have low risk of alcohol-related adverse outcomes (irrespective of their current level of alcohol consumption), whereas loss-framed messages (messages that communicate the risks of drinking) would be most beneficial for heavy drinkers (irrespective of their risk perceptions). The authors did not investigate the interaction between risk perceptions and alcohol consumption, so it is unclear what message frame would be most beneficial for heavy drinkers who consider themselves to have low risk of alcohol-related adverse outcomes.

A focus group study evaluating novel warning labels showed that participants preferred warning labels with health information that was not already known to them (Thomson et al., 2012). Unfortunately, the existing evidence on warning labels and behaviour change has not been implemented. The responsible drinking messages that are currently in use within Europe contain minimal information (recommended drinking guidelines, age restrictions, and pregnancy warnings; Farke, 2011) and do not inform alcohol consumers of alcohol-related harm. Additionally, warning labels in the UK are not mandated or regulated by government, but have been implemented under a voluntary agreement between government and the alcohol

industry (Department of Health, 2011a). Focus group research has shown that alcohol consumers considered the UK drinking guidelines to lack relevance to their own drinking practices (Lovatt et al., 2015). How alcohol users respond to current UK warning labels is yet to be examined.

Another factor that might be important when evaluating the effectiveness of responsible drinking messages is the context in which these messages are communicated. Responsible drinking messages can either be embedded in alcohol marketing (e.g., warning labels on alcohol packaging or responsible drinking statements in alcohol advertising) or communicated independently (i.e., public health campaigns). Some researchers argue that responsibility messages in alcohol advertising are predominantly used as an additional means to promote the product rather than convey public health information (K. C. Smith et al., 2014). For example, K. C. Smith et al. (2014) showed a variety of strategies that the alcohol industry uses to utilise responsibility messages as a marketing tool, such as using responsibility messages to make promises about the product's effect (e.g., "enjoy responsibly"). This seems to be a successful strategy, as public health campaigns sponsored by individual alcohol brands have been shown to maintain and even increase positive brand evaluations (S. W. Smith et al., 2009). A parallel literature on food advertising showed that an advert for 'healthy' fast food meals did not increase healthier food choices in children, but did increase liking for fast food in general, but not for the advertised fast food brand specifically (Boyland et al., 2015). The effect of branded public health campaigns on drinking cognitions and behaviour has not been investigated.

The aim of this study was to investigate subjective responses to current UK warning labels on alcohol packaging, public health campaigns and an alcohol advert that focussed on responsible drinking. We used focus group interviews to investigate this. Focus groups are a useful way to research these types of research questions, as researchers can use the group discussions to identify shared and common knowledge between participants and they can

facilitate discussion of sensitive topics, as less inhibited participants can break the ice for more shy participants (see Kitzinger, 1995 for a discussion of focus group methods). Focus groups have previously been used to study perceptions of tobacco warning labels (Cataldo, Hunter, Petersen, & Sheon, 2015), standard drink labelling (S. C. Jones & Gregory, 2009) and novel warning labels on packaging (Thomson et al., 2012). In this study, we showed focus group participants examples of warning labels on alcohol packaging, a televised public health campaign and an alcohol advert that focused on responsible drinking. Group discussions focused on participants' opinions of these labels/campaigns and their suggestions for responsibility messages that might be more persuasive for themselves.

6.3 Methods

Participants

A convenience sample of thirteen participants (77% female) took part in one of two focus groups (group 1 $n = 6$, group 2 $n = 7$). Participants were recruited via online advertisements circulated among students and staff at the University of Liverpool. Participants contacted the researcher via email to express interest in the study. Participants were eligible to take part if they were aged over 18, and drank at least 10 UK units/week, see Table 6.1 for participant characteristics. We recruited regular drinkers, because warning labels/public health campaigns are not likely to be personally relevant to abstainers and light drinkers. The study received ethical approval from the University of Liverpool Research Ethics Committee. No participants dropped out of the study.

Procedure

The focus group took place in a meeting room at the University of Liverpool, with no one present except the researchers and participants. After providing consent, participants

completed the AUDIT (Saunders et al., 1993), the 14-day retrospective timeline follow back diary (L. C. Sobell & Sobell, 1992) and RTCQ (Rollnick et al., 1992). The focus group discussion started once all participants finished completing their questionnaires. Participants were informed that the focus groups would remain strictly confidential and were each given a participant number before recording began. They were informed that discussions would be audio recorded and transcribed and that audio files would be deleted after transcription. The focus groups were facilitated by a researcher (IK) who used a semi-structured interview guide to stimulate discussion and obtain participants' opinions. IK was a female PhD student with no prior experience conducting focus group research. Another researcher (NC; female PhD student with experience conducting focus group research) was present to take notes of the conversation. Both researchers had no prior established relations with any of the participants. First, participants were asked to discuss their drinking habits (e.g., drinking location, drinking quantity and frequency). Then, participants were asked what they knew about warning labels on alcohol packaging and to discuss their opinion on the labels. Examples of alcohol packaging with health labels were passed around as a discussion aid. This was followed by a discussion of responsible drinking advertisements/public health campaigns. As a part of this, participants were asked to give their opinion on two examples of advertisements/commercials: a Drinkaware advert (public health campaign commercial) and a Heineken advert (branded responsible drinking advert; see Chapter 5). The order in which these were shown differed across the two focus groups. We asked participants for recommendations on alternative messages at two points in the discussion: after discussing warning labels on packaging and after the discussion on responsible drinking advertisements. At the end of the group discussion, participants were thanked and debriefed. Participants received study credits or a £5 shopping voucher. Each focus group discussion lasted approximately half an hour.

Data analysis

Focus groups were transcribed verbatim and analysed using thematic analysis, with the qualitative analysis software package NVivo 10. Thematic analysis is an analysis method that can be used independently of theoretical frameworks, during which the researcher inspects the transcript for recurrences of specific themes (Braun & Clarke, 2006). During data analysis, everything participants said was coded into one or more themes derived from the data by IK, based on the researcher's interpretation of the data. Then, key themes were identified in the coding, going back and forth between the data to check whether the themes represented the coded extracts and the entire data set. Six themes were identified that were relevant to the research question. An independent researcher (DR) checked whether the final themes were an accurate representation of the data set.

Table 6.1. Participant characteristics.

	Group 1 (<i>n</i> = 6)	Group 2 (<i>n</i> = 7)	Total (<i>N</i> = 13)
Variable	<i>M</i> (SD)	<i>M</i> (SD)	<i>M</i> (SD)
Gender (% female)	66.7%	85.7%	76.9%
Age	27.17 (8.08)	26.71 (9.21)	26.92 (8.35)
AUDIT	8.83 (4.83)	13.29 (3.50)	11.23 (4.60)
Weekly alcohol consumption	19.13 (7.39)	20.11 (9.14)	19.65 (8.05)
RTCQ Precontemplation	2.33 (3.20)	1.86 (2.85)	2.08 (2.90)
RTCQ Contemplation	-1.67 (3.39)	-1.57 (4.58)	-1.61 (3.91)
RTCQ Action	-3.00 (3.95)	-4.86 (2.48)	-4.00 (3.24)

6.4 Results

Six themes were identified that were relevant for answering the research question: Scepticism towards (1) current warning labels and (2) public health campaigns/adverts with a focus on responsible drinking, (3) mistrust of the message source and content, (4) the importance of shock value, (5) the impact of potential harm to others versus harm to self, and (6) the importance of communicating both short-term and long-term adverse outcomes from alcohol.

Responses to UK warning labels

Participants were generally aware of the UK warning label on alcohol packaging and were able to reproduce the message when asked. Most participants said they did not usually pay attention to warning labels. A common theme relating to why participants did not pay attention to warning labels was that the labels were not very prominent: *“They’re not so prominent either, are they? In the same way, they don’t have the same impact as the ones on cigarette packs for example.”* (Participant 6, group 1), and *“They don’t obviously want you to read it. Like, it’s right at the back of the bottle at the bottom.”* (Participant 1, group 2). The few participants that reported that they did look at warning labels, did this to be informed about the alcohol content of the product: *“I actually always look at the units. Just because I want to be aware of how much I’m consuming.”* (Participant 5, group 1). Despite this, the consensus was that labels would not influence their drinking behaviour: *“If you had a problem with unhealthy drinking, that little label isn’t going to stop you.”* (Participant 6, group 2). A reason that was named for this, is that once you see the label, it is “too late”: *“The thing is as well, you’re never going to see the label until you’ve bought the drink, so you’re gonna drink the drink anyway. [...] If you’re buying it at a bar, you’ve already bought the drink, so you’re gonna drink it despite what it’s got inside. You’ve wasted your money.”* (Participant 1, group

2).

Responses to UK responsibility adverts/commercials

Response to Drinkaware commercial

Participants responded negatively to the Drinkaware commercial. They said that “*it’s not very powerful*” (Participant 1, group 1) and they were sceptical of its effectiveness: “*A lot of people do urinate in the street when they’re drunk, but everybody knows that and everyone probably has done that at some point in their life anyway. So that’s not really gonna put people off drinking now, is it?*” (Participant 1, group 2).

Response to Heineken advert

The response to the Heineken Drink Slow advert was mixed. Some participants liked that the advert promoted an alternative to heavy drinking: “*It’s good that they give like an alternative. Like how else to enjoy your night.*” (Participant 1, group 1), and “*I think what it is communicating is that you can have fun without necessarily drinking or getting wasted. Because I think many people associate going out with getting wasted, whereas you can actually go out, have a few drinks and have a bottle of water as well.*” (Participant 5, group 1). Other were sceptical, because they felt the advert was unrealistic: “*Yeah, it’s also a little bit artificial. This like really glam club and everyone is really attractive, even at 6 in the morning. Just doesn’t look like people’s real life. If you’re actually looking to reduce how much people drink on a night out, it’s not going to relate at all.*” (Participant 6, group 2), and “*It was more like something you’d see in a film rather something in life, and I guess that’s part of the idea, but it wouldn’t necessarily encourage me to change my drinking habits and everything.*” (Participant 1, group 1). None of the participants indicated that the advert influenced their opinion of the brand.

Low message credibility

Throughout the group discussion, participants indicated that they did not find the responsible drinking messages credible. This had two reasons. First of all, participants did not believe the drinking guidelines were applicable to them. This was illustrated by this comment from a female participant about the different recommendations for men and women: *“I just keep thinking; I know a lot of my guy friends who I can out-drink easily and it’s just funny that if they’re reading the same bottle and the same, like, units that they’re supposed to drink vs me.”* (Participant 5, group 2). Another participant made the following comment about the recent change in drinking guidelines: *“I think for me it discredits it a bit, because like in different countries, there’s different recommended units and if they keep changing in this country, then you think: “Well, they will change again in a couple of years.” I think if you drink to a point where you personally feel fine then it’s not a problem. Also, for units for any size of person or age or physical state or metabolism... It just seems far too broad.”* (Participant 6, group 2). Secondly, participants did not trust the message source. For example, one participant did not trust the government’s motives for promoting responsible drinking: *“There is a really strong correlation with the fact that the costs of the repercussions of alcohol have went up so drastically the last few years and suddenly the government are trying to put people off alcohol. Whereas a few years ago, when it was making loads of money, really they were promoting and promoting it. So really you think nobody would care about you anyways so they’re trying to save money in different ways.”* (Participant 1, group 2). Other participants had doubts about alcohol brands promoting responsible drinking: *“The thing is that really they don’t want you to drink 2 or 3 units. Because the amount of money that they’ll be making if you’re drinking 20 units is going to be much more beneficial anyway. So, it’s all a massive lie.”* (Participant 1, group 1).

Shock value

When asked to describe any public health campaigns they had ever seen, participants predominantly described commercials that they considered to be shocking. *“I saw one [...] about a guy who was drink driving and he crashed into, like, a car full of children. That was pretty hard hitting. It was quite graphic, so...”* (Participant 1, group 1). This was also something they thought would encourage people to drink responsibly: *“Sometimes I think people really need to experience the bad outcome of their behaviours or kind of see, so at least they can say okay I change my mind now. Something that would shock people.”* (Participant 3, group 1) Other participants doubted whether it would actually change behaviour. *“I think [the commercials] initially shock you, but by the time you next drink it’s been a few days and you’ve forgotten about it.”* (Participant 3, group 2).

Harm to others

A theme that emerged throughout discussions in both groups, was that people should decide for themselves if they want to hurt themselves by drinking too much and that drinking heavily became problematic if it affected other people. *“Drinking is more than just your own problem, like, if you get in a car there are other people. That you crash and die yourself has nothing to do with, like, there are other people on the street that are completely uninvolved. [...] You know if you’re drinking more units than you should for yourself and that’s going to give you liver problems in the future, that’s you doing something to yourself, but if you’re getting in a car it can affect other people.”* (Participant 5, group 2). This was not specifically limited to drunk driving, as illustrated by this quote: *“I suffer terrible with hangovers. Not so much now, but years ago I used to suffer really bad and I was just out for the count the next*

day. But when I had the kids, if I had plans with them, I couldn't go. So that was one thing I missed out on. On a Sunday, my partner would have to take them out, or my mum and dad. So that's kinda like it's affecting my family, not just me." (Participant 7, group 2).

Recommendation for messages

Looking at recommendations for responsibility messages, participants recommended messages that communicated the negative consequences from drinking alcohol. The first recommendation was to communicate the long-term health consequences of alcohol: *"I think I'd want to know more factual based evidence. Like, if you drink this many units, that would lead to that over a certain amount of time. So more hard hitting type stuff. Diabetes, cardiovascular disease, those sorts of outcomes."* (Participant 6, group 1). The second recommendation was to communicate short-term regrets after drinking, such as hangovers and aggression: *"I think they need to focus more on the hangover bit. [...] And it's the bit that you kinda forget on a good night out and just having more drinks."* (Participant 2, group 2).

6.5 Discussion

The aim of this focus group study was to investigate alcohol consumers' responses to alcohol-related responsibility messages on alcohol packaging and in responsible drinking adverts. We studied this by conducting in-depth focus groups with two small groups of participants. Overall, participants in this study had a reasonable knowledge of the UK's drinking guidelines and were aware of responsible drinking messages on alcohol packaging and in advertisements. Participants did not think that current messages would influence their own or other people's drinking behaviour, regardless of the medium that was used to communicate them. In response to the Drinkaware commercial, participants reported that they did not think that it portrayed a relevant or important message and they did not consider it

persuasive. Even though some participants responded positively to the Heineken advert, they also highlighted that the situation in the advert was artificial and unrealistic. It should be noted here that the advert might imply that alcohol consumers can personally make the conscious decision to drink water instead of alcohol after consuming a drink of alcohol, without acknowledging that alcohol consumption might impair someone's decision making.

A potential reason for the lack of impact of the messages is the low message credibility that participants reported. This was two-fold: both the content of the message and the source of the message lacked credibility. Participants did not think that the recommended guidelines applied to them or others and considered them to be far too broad. In addition, they also mistrusted the issuer of the message, regardless of whether the issuer was the alcohol industry or the government. If the message appeared in alcohol marketing, they were suspicious of how the message fit in with a brand's motivation to increase revenue. They also doubted the sincerity of the government in trying to prevent alcohol abuse, as they felt that the government did this to save money, rather than to increase population health. General persuasion research shows that source credibility is an important factor in persuasion and that highly credible sources are more persuasive than sources with low credibility, see Pornpitakpan (2004) for a review. Source credibility has also been shown to be important for improving health behaviours, such as diet (Arora & Arora, 2004) and exercise (Arora, Stoner, & Arora, 2006). Additionally, strong arguments are more persuasive than weak arguments (Petty, Cacioppo, & Schumann, 1983) and argument strength has been shown to be important to persuade smokers to quit (S. Lee, Cappella, Lerman, & Strasser, 2011). So, it is not surprising that participants who did not find the message content and source credible, were also not persuaded to change their behaviour.

Participants did believe that other types of messages may be effective in motivating a reduction in drinking and we identified a number of recommendations for alternative messages

to encourage a reduction in alcohol consumption. Participants suggested three message types: messages that communicate long-term health outcomes from drinking, messages that communicate general short-term adverse effects from alcohol consumption and messages that communicate harm to others. The health recommendations are in line with expert recommendations that alcohol warning messages should be unambiguous, more prominent, and communicate specific adverse outcomes from alcohol (like tobacco warning labels; Al-hamdani, 2014). Indeed, very recent research on novel cancer-based alcohol warnings suggest they may be a viable strategy for reducing alcohol consumption (E. R. Miller, Ramsey, Baratiny, & Olver, 2016; Pettigrew et al., 2014; Pettigrew, Jongenelis, et al., 2016). In contrast, research on temporal framing showed that students that read a warning message that focused on short-term (vs long-term) consequences of alcohol use reported lower alcohol consumption in the subsequent month (Gerend & Cullen, 2008), consistent with what our focus group participants suggested. Our focus group participants also considered ‘shocking’ messages to be more powerful and effective. This is not supported by the literature, which shows that threatening health messages can induce reactance (see Ruiter et al., 2014 for a review). A final recommendation comes from participants’ opinion that alcohol consumption is problematic when it affects people other than the drinker. Warning messages that communicate how drinking affects other people than the drinker might be effective in reducing excessive alcohol consumption. We are not aware of any research that compares warning messages communicating harm to others with labels that communicate harm to self. However, research has shown that people value harm to others as more important in moral decision making than harm to themselves (Crockett et al., 2014) and a recent study showed that light drinkers (but not heavy drinkers) were more concerned about harm to others due to alcohol consumption than harm to themselves (Robertson, Thyne, & Hibbert, 2016). The findings by Robertson et al. (2016) spark a new research question. If participants are more concerned about harm to

others versus themselves, would warning messages that are in line with their specific concerns be more persuasive? Future research should consider message recommendations from light and heavy drinkers separately and investigate to what extent heavy and light drinkers think they would be persuaded by warnings about harm to self/others. Furthermore, future research should investigate how responsible drinking messages about harm to others affect alcohol-related attitudes and behaviour.

This study has some limitations. First of all, as with all focus group research, it is possible that participants who dominated the conversation caused other participants to refrain from giving different opinions (Kitzinger, 1995). We also used a relatively small sample size, which consisted of only three men due to convenience sampling. Therefore, these findings might not generalise to the general population. Additionally, themes that emerge in focus group discussions are context specific, so responses to the warning labels and adverts/commercials cannot be generalized to different labels or adverts/commercials. Another limitation is that our participants were not experts on behaviour change, so what messages they think will be effective may not actually be effective. Research by T. D. Wilson, Houston, and Meyers (1998) suggests that lay people rely on erroneous beliefs when evaluating how much a persuasive message would impact behaviour and that they do not fully recognize the extent to which a persuasive message has changed their own attitudes. In a similar vein, participants underestimate the effect of social influence and overestimate the effect of persuasive messages on their behaviour (Nolan, Schultz, Cialdini, Goldstein, & Griskevicius, 2008). Therefore, it is important to treat our participants' message recommendations with caution. However, a meta-analysis showed substantial correlations between the perceived effectiveness and actual effectiveness of persuasive messages across a range of behaviours (such as healthy eating, drinking and driving, and condom use; Dillard, Weber, & Vail, 2007). Combined with the evidence from the literature, it would be worth investigating whether the recommended

messages influence alcohol-related attitudes and drinking behaviour.

The focus group discussions demonstrated that participants do not think that current responsibility messages in the UK influence their drinking behaviour. This may be because people do not believe that UK government drinking guidelines apply to themselves and because they mistrust the brands and/or governments that communicate these messages. Future research should investigate the effect of messages that communicate adverse health outcomes, adverse short-term outcomes and adverse effects of alcohol on other people are more persuasive to alcohol users on alcohol-related attitudes and drinking behaviour.

Chapter 7

General discussion

This thesis investigated the extent to which individual differences in visual attention to alcohol cues and responsible drinking statements on alcohol packaging, in alcohol advertising and in alcohol-related public health campaigns were associated with intentions to consume alcohol, and actual drinking behaviour. This thesis also examined the direct effect of exposure to existing and novel UK warning labels (on packaging), alcohol advertisements and alcohol-related public health campaigns on drinking intentions and proximal alcohol consumption. In this chapter, I will first summarise the main findings, and then discuss their theoretical and practical implications. Then, I will discuss methodological strengths and limitations that might affect interpretation of these results. Finally, I will discuss directions for future research, followed by the general conclusion.

7.1 Summary of results

First, the studies in Chapter 2 investigated alcohol consumers' attention to existing warning labels on alcohol packaging and how this was associated with individual differences in motivation to reduce drinking. Results showed that warning labels attracted minimal attention (7 – 8% of total viewing time), and that the amount of attention was proportional to their relative size. Study 2.1 demonstrated that self-reported motivation to reduce drinking was associated with reduced attention to branding and warning labels on alcohol packaging. Although this was not replicated in study 2.2, it was demonstrated that a brief alcohol intervention reduced attention to branding, but did not increase attention to warning labels. Additionally, an experimental manipulation that encouraged participants to focus their

attention on warning labels did not influence their intentions to consume alcohol in the subsequent week.

Following the results from Chapter 2, the studies reported in Chapter 3 investigated whether a novel health warning label on alcohol packaging ('Every drink of alcohol harms your brain') would capture more attention than existing warning labels, and if exposure to this label would reduce participants' intended alcohol consumption in the subsequent week and reduce how much participants were willing to pay for alcohol. There was no evidence that novel health warnings affected drinking intentions (study 3.1) and some evidence that participants were willing to pay less money for alcohol products that contained the novel label compared to the existing label, as predicted, but this was not robust (studies 3.2 and 3.3). Results also showed that participants did not pay more (or less) attention to health labels than existing labels, and individual differences in attention to any of the labels did not predict willingness to pay for alcohol on a trial-by-trial basis. However, individual differences in visual attention to novel warning labels, but not existing labels, significantly predicted label recall.

Then, Chapter 4 set out to investigate whether alcohol advertising would increase alcohol consumption shortly after exposure compared to soda and control adverts, and whether this would be particularly due to increased consumption of the specific product that was advertised. Results demonstrated that alcohol advertising did not increase participants' likelihood of drinking alcohol during the study in general, nor the advertised alcohol brand specifically. Additionally, participants were not more likely to drink alcohol shortly after they had viewed the alcohol adverts.

This was followed by an investigation of visual attention to alcohol cues and responsible drinking statements in alcohol-related public health campaigns and alcohol advertising (Chapter 5). Study 5.1 measured alcohol consumers' attention to alcohol cues and responsible drinking statements in alcohol-related public health campaigns, traditional alcohol

adverts, and alcohol advertising with a focus on responsible drinking, and investigated how this was related to drinking intentions. Results showed that attention to alcohol cues significantly differed across advertisements, but this was not correlated with drinking intentions. Participants who watched the alcohol-related public health campaign and a traditional alcohol advert spent a similar proportion of alcohol display duration viewing the alcohol cues, and both paid more attention to the alcohol cues than participants who viewed an alcohol advert with a responsible drinking message. However, participants who viewed the public health campaign attended more to the responsible drinking statements than the alcohol cues, whereas the opposite was true for participants who viewed the alcohol advert with a responsible drinking message. These differences in attention were roughly proportional to differences in display duration and display size between the advertising conditions. Subsequently, study 5.2 measured alcohol consumers' attention to responsible drinking statements and different types of alcohol cues in alcohol advertisements, and investigated how this was associated with their subsequent *ad libitum* alcohol consumption in a laboratory setting. Results showed that attention to the responsible drinking statements or general alcohol cues did not significantly predict immediate alcohol consumption. However, analysis separated by alcohol cue type (alcohol packaging, alcohol drinks in a glass, portrayal of alcohol consumption, and brand logos) revealed that attention to the portrayal of alcohol consumption in adverts significantly predicted subsequent alcohol consumption: Participants who attended to alcohol portrayal longer, drank more alcohol during the taste test. There was no evidence that attention to any of the other alcohol cues predicted immediate alcohol consumption. Additionally, we found that participants paid minimal attention to the responsible drinking statement in alcohol advertisements (~1% of total display time), but the majority (91.9%) were still aware that the message referred to the Drinkaware website.

Finally, Chapter 6 described a focus group study that was conducted to investigate

alcohol consumers' responses to alcohol-related responsibility messages on alcohol packaging and in public health campaigns/adverts with a focus on responsible drinking. Results showed that participants in this study had a reasonable knowledge of the UK's drinking guidelines and were aware of responsible drinking messages on alcohol packaging and in advertisements. However, participants did not think that existing messages would influence their own or other people's drinking behaviour, regardless of the medium that was used to communicate them. A potential reason for the lack of impact is the low message credibility that participants reported. This was two-fold: both the content of the message and the source of the message lacked credibility. Participants did not think that the recommended guidelines applied to them or others and considered them to be far too broad. In addition, they also mistrusted the issuer of the message, regardless of whether the issuer was the alcohol industry or the government. If the message appeared in alcohol marketing, they were suspicious of how the message fit in with a brand's motivation to increase revenue. They also doubted the sincerity of the government in trying to prevent alcohol abuse, as they felt that the government did this to save money, rather than to increase population health. Participants recommended other types of messages that they thought would be effective at motivating people to reduce their alcohol intake: messages that communicate long-term health outcomes from drinking, messages that communicate general short-term adverse effects from alcohol consumption and messages that communicate harm to others.

Taken together, the studies in this thesis demonstrated that responsible drinking messages that were displayed together with alcohol marketing attracted little attention, regardless of whether they were displayed on alcohol packaging or in alcohol advertising. However, responsible drinking messages attracted more attention if they were more prominent. For example, participants paid more attention to warning labels on alcohol packaging if they were larger in size, and paid more attention to responsible drinking messages if they were

displayed in an alcohol advert with a responsible drinking focus. However, responsible drinking messages only attracted more attention than alcohol cues in the public health campaign used in study 5.1. Visual attention to responsible drinking messages did not predict intentions to consume alcohol in the next week, alcohol consumption in the lab, nor willingness to pay for alcohol, regardless of the medium on which they were displayed. Individual differences in visual attention to alcohol cues in general were also not predictive of intentions to drink alcohol or alcohol consumption in the lab. However, visual attention to alcohol portrayal in alcohol advertising specifically was associated with greater alcohol consumption in the lab. There was no evidence that visual attention to alcohol portrayal in public health campaigns affected intentions to drink.

Across all studies, exposure to alcohol-related persuasive messages did not have a direct effect on drinking intentions or actual consumption shortly after exposure. Existing and novel warning labels did not affect drinking intentions or willingness to pay for alcohol compared to a control label (Chapter 3). Exposure to a public health campaign or an alcohol advert with responsible drinking message did not reduce intentions to drink compared to exposure to traditional alcohol advertising (Chapter 5). Alcohol advertising did not increase alcohol consumption in the laboratory (Chapter 4). The findings from Chapter 6 might explain why warning labels and public health campaigns did not affect behavioural intentions. Participants did not think that existing warning messages were relevant to their own situation. Instead, they thought that messages that explained the adverse effects of alcohol consumption (in the short-term and the long-term, as well as potential effects on other people) would be more persuasive for themselves.

7.2 Theoretical implications

The results in this thesis may be explained through dual process models of behaviour

(previously discussed in section 1.5.2) and persuasion (discussed in section 1.6.1).

Across all studies, alcohol cues attracted more attention than warning statements. This might reflect an attentional bias towards alcohol cues, which is associated with increased motivation to drink alcohol (Field et al., 2016). Additionally, visual attention to warning statements (which was thought to be associated with greater reflective processing of the message) did not predict intentions to consume alcohol in the next week, willingness to pay for alcohol and actual alcohol consumption in the laboratory. As warning statements were always accompanied by alcohol cues, it is possible that selective attention towards alcohol cues associated with the impulsive system overshadowed any reflective processing of the warning statements. Therefore, the mere presence of alcohol cues might be sufficient to activate motivational processes to consume alcohol (see Van Dyke & Fillmore, 2015).

The findings in this thesis suggest that alcohol cues might even activate motivational processes to consume alcohol if they are presented alongside information about the negative effects of alcohol. For example, alcohol consumers in study 5.1 who were exposed to alcohol-related public health campaigns did not intend to drink less alcohol in the subsequent week than participants who were exposed to traditional alcohol advertising. Previous research showed similar results. For example, viewing alcohol-related public health campaigns caused heavy drinkers to decrease their negative implicit attitudes towards alcohol, which was similar to the effect of viewing pro-alcohol advertisements (K. G. Brown et al., 2015). Additionally, exposure to public health campaigns that displayed positive and negative imagery related to alcohol increased alcohol consumption in the laboratory (Moss et al., 2015), and the inclusion of smoking cues in anti-smoking advertising increased smokers' urge to smoke (Kang, Cappella, Strasser, & Lerman, 2009) and led to poorer message recall (S. Lee & Cappella, 2013). In the context of the elaboration likelihood model (ELM), these findings suggest that the addition of peripheral alcohol cues might hinder central processing of the warning

statements, and, as a result, disrupt subsequent persuasion.

However, ELM might not be suitable to evaluate why specific messages did not result in persuasion, as it proposes a large range of ways that any given variable can facilitate or hinder message elaboration (see Figure 1.3). Additionally, even under high elaboration conditions, weak arguments do not lead to attitude change (Carpenter, 2015). The studies in this thesis were not designed to distinguish between persuasion (or absence of persuasion) due to heightened/lowered elaboration or perceived argument strength. However, the findings from study 2.2 suggest that both factors might underlie the overall finding that exposure to warning statements did not affect behavioural intentions. For example, personal relevance of a message has been shown to increase message elaboration (Ajzen et al., 1996). However, there was no evidence that participants who received a brief intervention attended more to the warning labels than participants in the control condition. This suggests that, even though the warning label would be more personally relevant to participants after a brief intervention, this did not lead to increased elaboration. On the other hand, a manipulation to increase attention to the warning label did not reduce participants' intentions to consume alcohol. This suggests that the warning label message communicated a weak persuasive argument, as it did not lead to persuasion under high elaboration conditions.

Taken together, the findings suggest that, in line with dual process theories, impulsive processing of alcohol cues was a stronger predictor of drinking behaviour than reflective processing of warning statements, which might be due to specific warning label features. In the next section, I will discuss the practical implications of these findings.

7.3 Practical implications

7.3.1 Persuasion context

Findings from this thesis and previous research suggest that the context in which

warning messages are communicated might be important. Warning messages that are communicated in the presence of alcohol marketing might be less effective than warning messages that are communicated independently. In line with findings by Thomsen and Fulton (2007), the studies in this thesis demonstrated that participants attended more to alcohol cues than warning labels on alcohol packaging (Chapter 2) and in alcohol advertising (Chapter 5). However, in an alcohol-related public health campaign, warning labels attracted proportionally more attention than alcohol cues, after taking differences in display duration into account (Chapter 5). This suggests that warning messages might be more effective if they are displayed independently from alcohol marketing. Similarly, non-smokers and weekly smokers attended more to tobacco warning labels on plain packaging (i.e., in the absence of tobacco marketing) than on branded packaging (Munafò et al., 2011; Shankleman, Sykes, Mandeville, Di Costa, & Yarrow, 2015). Another study showed that warning labels in print adverts for sugar sweetened beverages reduced participants' intentions to purchase the product, but this effect was attenuated if the adverts included positive images (Effertz, Franke, & Teichert, 2014).

The finding from study 5.1 that alcohol cues attracted more attention than responsible drinking messages in an alcohol advert with a responsible drinking message implies that industry-sponsored warning statements might have little effect on behaviour. This is in line with research by (K. C. Smith et al., 2014), who suggested that responsible drinking messages in alcohol advertisements were predominantly used as an additional means of promoting alcohol, rather than to deter alcohol consumption. Additionally, focus group participants in Chapter 6 mistrusted alcohol manufacturers' motives for producing responsible drinking advertisements and they disregarded the advertisements' message as a consequence. Therefore, industry-sponsored warning messages might produce unexpected and unwanted results, such as increased alcohol consumption. Notably, an anti-smoking advert created by a tobacco brand increased the likelihood that participants would smoke a cigarette shortly after seeing the

advert, compared to a control advert (Harris et al., 2013). Taken together, these patterns of results suggest that the presence of alcohol marketing might reduce the beneficial impact of alcohol warning labels on drinking behaviour.

7.3.2 Warning message design

The findings reported in this thesis suggest that design features of warning messages might influence their effectiveness. For example, Chapter 2 demonstrated that warning labels attracted more attention if they were larger in size. Indeed, the warning labels used in Chapter 3 attracted more attention than those in Chapter 2, which could be accounted for by the fact that they occupied a larger surface area on the alcohol container. Additionally, warning messages in alcohol adverts and public health campaigns with a responsible drinking message attracted more attention than warning messages in traditional alcohol advertising (Chapter 5), an effect that could be explained by the increased size and display duration of the responsible drinking messages. Similarly, Thomsen and Fulton (2007) demonstrated that warning messages in alcohol print advertising attracted more attention if the alcohol adverts had a responsible drinking theme. Thomsen and Fulton (2007) did not take size differences into account, so this effect might be due to increased salience of the warning messages in responsible drinking themed alcohol adverts.

An implication of these results is that factors that increase the visual salience of warning messages might enhance their effectiveness. For example, a recent study demonstrated that a nutrition label with serving size recommendations reduced participants' snack food intake, but only if the label attracted sufficient attention (Versluis, Papies, & Marchiori, 2015). Similarly, graphic warning labels in tobacco print adverts attracted more attention than text-only warnings (Strasser et al., 2012) and increased smokers' intentions to quit smoking (Davis & Burton, 2016). Additionally, plain cigarette packaging (which maximises tobacco warning label

salience and minimizes brand appeal) has been shown to have a greater effect on purchasing intentions than increased size of warning labels alone (Wakefield et al., 2012). Taken together, these results suggest that more salient alcohol warning messages might have a greater effect on alcohol consumption.

7.3.3 Warning label message

The studies in Chapter 3 suggested that none of the messages that were tested (including the currently implemented UK warning labels) are likely to lead to a reduction in alcohol consumption, as their effect on intentions to drink and demand for alcohol was not significantly different from a control message. Therefore, it would be worthwhile to investigate different warning messages in the future. Focus group participants in Chapter 6 named three types of messages they thought would be persuasive: 1) messages that communicate long-term health outcomes from drinking, 2) messages that communicate general short-term adverse effects from alcohol consumption and 3) messages that communicate harm to others. These suggestions are supported by the warning label literature (e.g., E. R. Miller et al., 2016; Gerend & Cullen, 2008; Robertson et al., 2016; see Chapter 6 for a detailed discussion).

The broader literature on behaviour change suggests some additional messages that might be worthwhile to investigate in the future. Michie et al., (2012) created a taxonomy of behaviour change techniques that have been used in interventions to reduce excessive alcohol consumption. They analysed which behaviour change techniques in brief interventions were associated with the greater effect sizes of the interventions. Their results showed that prompting self-monitoring was associated with greater intervention effect sizes. Similarly, regular self-monitoring of progression towards a goal was associated with greater goal attainment (see Harkin et al., 2016 for a meta-analysis). Adapting behaviour change techniques from brief interventions to warning labels might not be straight forward. One possibility could be to

include questions on warning labels that ask the alcohol consumer how many drinks they have consumed that day. This might prompt alcohol consumers to monitor their own consumption more, which might lead to a reduction in alcohol consumption. To the best of my knowledge, prompting self-monitoring via warning labels has not been investigated yet.

7.3.4 Effect of alcohol cues on effectiveness of persuasion attempts

The results from study 5.2 demonstrated that visual attention to alcohol cues in alcohol advertising in general was not predictive of subsequent alcohol consumption in the lab, but individual differences in visual attention to alcohol portrayal (for example, an actor sipping alcohol) predicted the amount of alcohol that participants consumed immediately afterwards. Additionally, there was no evidence that an alcohol-related public health campaign reduced participants' intentions to consume alcohol in the subsequent week in study 5.1, but this might be because the inclusion of alcohol portrayal (which was not present in the other advertising conditions) might have reduced the effectiveness of the public health campaign. Research on tobacco advertising suggested that smoking cues in anti-tobacco advertising might produce unwanted effects. The inclusion of smoking cues in anti-smoking advertisements increased regular smokers' urge to smoke (Kang et al., 2009), reduced the perceived effectiveness of the advertisements among regular smokers (S. Lee et al., 2011; but not intermittent smokers, or non-smokers, Xu, 2016), and led to poorer message recall (S. Lee & Cappella, 2013), compared to anti-smoking advertisements that did not include smoking cues. One study demonstrated that active smoking cues (i.e., someone smoking a cigarette) in anti-smoking adverts attracted more attention than passive smoking cues (e.g., a pack of cigarettes; Sanders-Jackson et al., 2011). These findings suggest that the inclusion of certain alcohol cues (such as alcohol portrayal) might increase the influence of alcohol advertising and reduce the influence of warning messages on alcohol consumption.

7.3.5 Policy

Taken together with findings from tobacco research, the findings report in this thesis have some important implications for policy makers. The studies in this thesis demonstrated that alcohol consumers pay relatively little attention to warning messages on alcohol packaging (Chapters 2 and 3) and in alcohol advertising (Chapter 5). However, despite the limited attention to warning messages, message awareness was high in Chapters 3, 5, and 6. Nevertheless, existing warning labels on alcohol packaging did not reduce participants' intentions to drink or willingness to pay for alcohol, compared to a control message (Chapter 3) and participants who were exposed to an alcohol-related public health campaign did not intend to consume less alcohol than participants who viewed an alcohol advertisement. These findings suggested that existing warning messages are unlikely to be an effective means to reduce alcohol consumption in the UK.

However, warning labels on tobacco packaging (Hammond, 2011) and anti-tobacco advertisements (Durkin et al., 2012) have been successful strategies to discourage smoking uptake and encourage smoking cessation. Therefore, researchers have argued that existing alcohol warning labels would be more effective if they were more similar to tobacco warning labels (Al-hamdani, 2014). Currently, many warning messages use responsible drinking statements, which are ambiguous and ill-defined (Barry & Goodson, 2010; Martin-Moreno et al., 2013), and might be more likely to encourage alcohol consumption (Pettigrew, Biagioni, et al., 2016; K. C. Smith et al., 2014; S. W. Smith et al., 2009). Results from Chapter 6 suggested that warning messages might be more effective if they provided clear information about the risks of alcohol consumption and provided unambiguous behavioural recommendations. Indeed, Al-hamdani and Smith (2015) demonstrated that warning labels that provided unambiguous information about the effect of alcohol consumption on liver cancer made people

perceive the product more negatively compared to non-labelled products. In addition, products with warning labels that were accompanied by a picture of liver cancer received even more negative product evaluations than products with text-only labels. In two recent studies, warning labels about liver cancer also increased participants' intentions to reduce drinking (Wigg & Stafford, 2016) and reduced participants' drinking speed (Stafford & Salmon, 2016), regardless of whether the warning label was text-only or included a picture of liver cancer. However, the sample size of these studies were small and these labels have not been evaluated outside the laboratory yet. Nevertheless, these findings suggest that alcohol warning labels might be more effective if they use similar communication strategies as tobacco warning labels, and clearly communicate the harmful consequences of drinking.

Another important difference between tobacco warning labels and alcohol warning labels is that tobacco warning labels have been implemented against a backdrop of tobacco control policies (such as a ban on smoking in public, advertising bans and price increases; Levy, Currie, & Clancy, 2013). A systematic review of the independent effects of tobacco control interventions suggested that there is insufficient evidence to conclude that warning labels had an independent effect on smoking (L. M. Wilson et al., 2012). However, it is likely that tobacco control interventions have an additive effect and that warning labels are more effective combined with other interventions. For example, Weiss et al. (2006) demonstrated that exposure to anti-tobacco advertisements reduced adolescents' susceptibility to take up smoking. On the other hand, exposure to pro-tobacco advertising increased adolescents' susceptibility to take up smoking and this effect was stronger than the protective effect of exposure to anti-tobacco advertisements. It is therefore possible that anti-tobacco marketing has a greater effect on population smoking levels if it is combined with a ban on advertising (as is currently the case in the UK; Levy et al., 2013). Alcohol warning labels and public health campaigns might be more effective if they are implemented alongside more effective

population policies that restrict the availability and marketing of alcohol (Anderson, Chisholm, et al., 2009).

Finally, the current policy context is likely to be important for the effectiveness of alcohol warning labels. At the moment, UK warning labels are implemented as part of the responsibility deal, a voluntary pledge scheme that is self-regulated by the alcohol industry. Additionally, the UK warning labels refer alcohol consumer to a website by the industry-funded NGO Drinkaware. However, industry self-regulation with regards to alcohol policy has been heavily criticised (Noel, Babor, & Robaina, 2016; Noel, Lazzarini, Robaina, & Vendrame, 2016). For example, responsibility deal pledges regarding warning labels on alcohol packaging have not been met (Petticrew et al., 2015). Even though the Portman Group guidance encourages companies to use a font that is not smaller than the main body of the information (Portman Group, 2011), Petticrew et al. (2015) found that approximately 60% of the warning labels used a font size that was smaller than the main text of the packaging label. The studies in Chapter 2 showed that larger warning labels attracted more attention, which may increase their effect on behaviour. However, based on the findings by Petticrew et al., it might be necessary to require (rather than encourage) the use of larger warning labels, to ensure industry-wide implementation.

7.4 Methodological strengths and limitations

The studies reported in this thesis had some strengths and limitations. The participants who took part in the laboratory studies were recruited through the University of Liverpool, so the majority of the samples were comprised of university students. Therefore, the studies investigated a relevant population for responsible drinking messages, as university students are likely to engage in hazardous drinking (Davoren et al., 2016). However, as university students are highly educated, this limits the generalizability of the findings reported in this thesis. For

example, a recent study demonstrated that audio-visual smoking education more effectively taught low-educated adolescent about smoking risks than the same information in print-format (de Graaf, van den Putte, Zebregs, Lammers, & Neijens, 2016). It is unclear to what extent the findings in this thesis would generalize to different populations, such as older drinkers or lower SES populations. Additionally, most studies in this thesis tested more women than men. A recent review argued that gender-specific effects of alcohol policies are underreported and discussed evidence that suggested that male adolescents were more likely to be influenced by broadcast advertising for beer, whereas female adolescents were more likely to be influenced by print advertising (Fitzgerald, Angus, Emslie, Shipton, & Bauld, 2016). The studies reported in this thesis were not designed or powered to detect gender differences, so it unclear whether the overall effects were comparable for men and women.

A common, and often under-reported limitation of experimental research is the possibility that certain characteristics of the experiment (called ‘demand characteristics’) increase participants’ awareness of study aims or hypotheses (Klein et al., 2012). In turn, this may cause the participant to behave differently than if they were not aware of the aims. The presence of demand characteristics increases the likelihood that the study hypothesis will be confirmed. For example, if participants are aware of the study aims or hypothesis, they are more likely to adjust their behaviour in line with the study hypothesis (Nichols & Maner, 2008). Additionally, if participants are aware of a study’s outcome measure (for example, how much alcohol they consumed), they might adjust their behaviour in order to manage desirable impressions. For example, participants who were aware that their snack food consumption would be monitored ate less than unaware participants (Robinson, Kersbergen, Brunstrom, & Field, 2014). This suggests that participants might drink less if they know that the purpose of the bogus taste test was to measure alcohol consumption. However, participant awareness of the purpose of the taste test did not affect how much they consumed during the taste test (A.

Jones et al., 2016). In order to reduce demand effects, all studies in this thesis used a cover story to obscure the study aims. Additionally, every study measured whether participants guessed the study aims. Across all studies, participants were generally unaware of the study aims, with the exception of the study reported in Chapter 4. A large minority of participants were aware of the study aims in Chapter 4, however, statistical analyses suggested that this did not affect their behaviour.

Experimenter awareness of the study hypotheses is a special type of demand characteristic that might also affect the results. In a recent study, a manipulation that primed participants with the stereotype of old age significantly reduced participants' walking speed, but only for participants who were tested by an experimenter who believed that the manipulation would reduce walking speed (Doyen, Klein, Pichon, & Cleeremans, 2012). The priming manipulation did not affect walking speed for participants who were tested by an experimenter who was led to believe that the manipulation would increase walking speed. In the studies reported in this thesis, the experimenter was not blind to the study hypotheses, but where possible the experimenter was blinded to participants' conditions in the experimental studies. The experimenter was blinded to the attention manipulation in study 2.2 and the advertising condition in Chapter 4. It was not possible to blind the experimenter to the intervention condition in study 2.2 (as the experimenter delivered the intervention), or the advertising condition in study 5.1. Therefore, it is possible that experimenter demand characteristics might have influenced the outcomes of these studies in particular. However, the outcome measures in all studies in this thesis were collected electronically (Chapters 2, 3, and 5), or using a questionnaire booklet (Chapter 4) and the experimenter did not interact with participants while they completed the questionnaires. Additionally, the findings in this thesis generally did not support the hypothesis, therefore, it is unlikely that experimenter demand characteristics influenced participant responses to these questionnaires.

Additionally, most studies measured the effect of alcohol-related persuasion attempts on intentions to consume alcohol in the subsequent week and intentions to binge drink in the subsequent week. This outcome measure was selected because prior research on the theory of planned behaviour has demonstrated that (binge-)drinking intentions are reliable predictors of prospective behaviour (Elliott & Ainsworth, 2012; Huchting et al., 2008; Todd & Mullan, 2011). However, it is unclear whether measures of drinking intentions are sensitive to temporal fluctuations in behavioural motivation due to advertisements or warning statements. For example, study 5.1 showed no evidence that exposure to public health campaigns influenced participants' intentions to consume alcohol, whereas exposure to public health campaigns did reduce participants' urge to drink in an online study (Stautz & Marteau, 2016). Similarly, a recent study showed that videos that displayed positive outcomes of alcohol consumption increased adolescents' willingness to drink alcohol in a hypothetical situation, but did not affect how much they intended to consume in this situation (Gibbons et al., 2016). Even though willingness to drink and intentions to drink were positively associated in another study, willingness to get drunk during spring break and intentions to get drunk during spring break predicted separate aspects of future behaviour: Behavioural willingness (but not intentions) predicted risky drinking behaviour (drinking until blacking out), whereas behavioural intentions (but not willingness) predicted less risky behaviour (getting drunk; Litt et al., 2014). Therefore, it is possible that drinking intentions did not capture changes in more automated aspects of behaviour, such as drinking urges or willingness to drink.

Finally, the primary purpose of this thesis was to investigate the role of attention in the effect of alcohol-related persuasion attempts on behaviour. As a result, the studies took place in the laboratory and measured the effect of a single exposure to warning statements. However, it is possible that a single exposure to warning statements is not sufficient to prompt behaviour change. For example, cumulative exposure to alcohol advertising was associated with greater

levels of alcohol consumption (Anderson, de Bruijn, et al., 2009) and cumulative exposure to anti-smoking adverts was associated with decreased likelihood of smoking uptake (Sly, Trapido, & Ray, 2002). Single session laboratory experiments, as used in this thesis, are not suitable to detect cumulative effects of alcohol warning statements that become apparent after multiple exposures.

These studies also had strengths. All chapters except Chapter 3 used existing warning labels and alcohol-related advertisements as the test stimuli. Therefore, the studies captured responses to alcohol persuasion attempts in the format that they are currently presented (e.g., warning labels communicating drinking guidelines instead of health risks). Furthermore, this format is likely to be used in the near future, in the absence of changes to alcohol policy. This means that the studies captured relevant behaviour in response to contemporary persuasion attempts. Additionally, these studies used a variety of methods, including within-subjects and between-subjects experiments, cross-sectional studies and focus groups, in order to investigate a range of responses to alcohol-related persuasion attempts. Therefore, findings did not depend on the study methodology that was used. Finally, the current studies measured visual attention to warning statements, which has been shown to predict product choice (Bialkova et al., 2014) and risk perceptions (Lochbuehler et al., 2016).

7.5 Future research

The findings discussed in this thesis highlight interesting new avenues for future research. Firstly, as the findings in Chapter 2 demonstrated that participants did not pay more attention to existing warning labels if they were motivated to reduce drinking, or after a brief intervention, future research should examine different messages that might attract more attention in a population that is perhaps more open to reducing their alcohol consumption (Cox, Pothos, & Hosier, 2007). Research has investigated the effect of different types of alcohol

warning messages (e.g., cancer-related messages; Al-hamdani & Smith, 2015; E. R. Miller et al., 2016; Pettigrew, Jongenelis, et al., 2016; Stafford & Salmon, 2016; Wigg & Stafford, 2016), however these studies did not compare the novel warning messages with existing warning labels. Therefore, it is unclear whether these messages would be more effective than existing warning labels. One study demonstrated that the addition of a self-affirming implementation intention to existing warning labels prompted participants to reduce their alcohol consumption in the subsequent month (Armitage & Arden, 2016). The self-affirming implementation intention was hypothesized to reduce avoidance of the label message (by reducing anxiety in response to the label message), which might have increased attention to the warning label during the subsequent month. This might have accounted for the reduction in alcohol consumption. Future research should compare cancer-themed warning labels to existing warning labels and investigate whether labels accompanied by self-affirming implementation intentions reduce alcohol consumption due to increased attention to the warning labels.

Our findings also demonstrated that visual attention to alcohol portrayal was associated with increased alcohol consumption in the laboratory. The inclusion of alcohol portrayal in the public health campaign investigated in study 5.1 might also explain the finding that exposure to public health campaigns affected future drinking intentions at a similar level as alcohol advertising, but this could not be formally tested. As research showed that the inclusion of smoking cues in anti-tobacco advertising increased smokers' urge to smoke (Kang et al., 2009), future research should investigate how alcohol portrayal in alcohol advertising and public health campaigns affects alcohol consumption and motivation to reduce drinking.

7.6 Conclusions

The studies in thesis demonstrated that existing warning labels on alcohol packaging

and in alcohol advertising attract little attention, even among participants who are motivated to reduce alcohol consumption. Additionally, individual differences in attention allocation to warning statements was not predictive of antecedents of alcohol consumption or actual alcohol consumption in the laboratory. However, results also demonstrated that warning labels attracted more attention if they were more prominent. For example, increases in warning label size were associated with increases in attention. Similarly, warning statements attracted more attention if they appeared in alcohol advertising or public health campaigns that focussed on responsible drinking. Therefore, alcohol warning labels and public health campaigns might have little scope to change behaviour in their current format. However, warning statements that are more prominent and communicate adverse outcomes from alcohol consumption could be more effective, particularly if design changes are combined with more stringent restrictions on alcohol marketing and the visual cues used within marketing.

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