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Consumer Reactions to Alcohol Advertising Health Warnings in Ireland: An Experimental Research Study

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Consumer Reactions to Alcohol Advertising Health Warnings in Ireland: An Experimental Research Study

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ABSTRACT

Introduction and Aims: As part of several measures to inform consumers about the health risks of alcohol and reduce alcohol consumption, the Irish Government signed into law the Public Health (Alcohol) Act 2018, with Section 13 requiring the implementation of multiple health warnings in all alcohol ads. While health warnings on product labels have been subject to intensive political discussion and academic research, health warnings in alcohol ads have received little attention and empirical support. This doctoral dissertation investigates whether health warnings in alcohol ads can promote cognitive and affective reactions in consumers. Furthermore, this thesis also examines whether the exclusion of advertising social imagery makes health warnings more effective.

Method: A between-subject factorial survey experiment was conducted with a convenience sample of adults (n = 932) in Ireland to compare single-text, multiple-text, and shocking image-and-text health warning designs displayed on two types of alcohol ads (an ad with social imagery featuring people drinking alcohol in a social setting and an ad featuring only the alcohol product). Recall and believability of health warnings, negative emotions, perceived personal risks of alcohol use, knowledge of the health effects of alcohol and self-efficacy to drink less were measured after viewing each alcohol ad with and without health warnings.

Results: Factors yielding higher probabilities of recall include: health warning designs, gender, and drinking status. Significant differences were also found between health warning designs on negative emotions and believability, particularly that single-health warnings, with and without imagery, were more effective in increasing negative emotions than multiple health warnings, whereas multiple warnings were found more believable than single warnings. There were no significant direct effects between all three warning designs on perceived personal risks of alcohol use, knowledge of the health effects of alcohol and self-efficacy to drink less. The varied health warning designs did not differ across demographic groups, and there was no evidence to suggest that social imagery alcohol ads decrease the effectiveness of health warnings across the outcomes.

Conclusions: This research makes several theoretical and practical contributions, the most important of which is the examination of multiple-text health warnings and cancer warnings, with and without shocking imagery, in an entirely new context, which is that of alcohol advertising. Overall, this thesis demonstrates that alcohol ads with cancer health warnings were the most effective warning design, which is consistent with prominent fear appeal theories suggesting that an effort should be placed to design health warnings that lead to emotional effects as one powerful health message such as cancer can be more impactful than multiple-text health messages displayed simultaneously on alcohol ads.

DECLARATION

I certify that this thesis which I now submit for examination for the award of PhD is entirely my own work and has not been taken from any other work. This thesis was prepared according to the regulations for postgraduate study by research of the Technological University Dublin (TU Dublin) and has not been submitted in whole or in part for another award in any Institute or University. The work reported in this thesis conforms to the principles and requirements of TU Dublin's guidelines for ethics in research. The University has permission to keep, lend or copy this thesis in whole or in part, on condition that any such use of the material of the thesis be duly acknowledged.

Signature:  Date: 29/12/2022

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ABBREVIATIONS

AAI – Alcohol Action Ireland

ASAI – Advertising Standards Authority for Ireland

AlHaMBRA Project – Alcohol Harm Measuring and Building Capacity for Policy Response and Action

ANCOVA – Univariate Analysis of Covariance

ANOVA – Univariate Analysis of Variance

AUDIT-C – Alcohol Use Disorders Identification Test

B – Regression Coefficient

BCa – Bias Corrected and Accelerated Bootstrap Interval

C-HIP – Communication-Human Processing Model

CI – Confidence Interval

CLT – Cognitive Load Theory

CCCI – Central Copy Clearance Ireland

ELM – Elaboration Likelihood Model

EPPM – Extended Parallel Process Model

EU – European Union

EUCAM – European Centre for Monitoring Alcohol Marketing

EUROCARE – European Alcohol Policy Alliance

FDA – Food and Drug Administration United States

H – Hypothesis

HBM – Health Belief Model

HRB – Health Research Board

HSE – Health Service Executive

HW – Health Warning

IAC – International Alcohol Control

IARC – International Agency for Research on Cancer

IARD – International Alliance for Responsible Drinking

ITC – International Tobacco Control

ITC-6 – European country W2 survey (2018)

MANCOVA – Multivariate Analysis of Covariance

MANOVA – Multivariate Analysis of Variance

MEAS – Mature Enjoyment of Alcohol in Society Limited

MCAR – Little's Missing Completely at Random

OECD – Organisation for Economic Co-operation and Development

PHAA – Public Health (Alcohol) Act 2018

PMT – Protection Motivation Theory

PPM – Parallel Process Model

SCT – Social Cognitive Theory

SD – Standard Deviation

SE – Standard Error of the Mean

SPSS – Statistical Package for the Social Sciences

TPB – Theory of Planned Behaviour

TU Dublin – Technological University Dublin

UK – United Kingdom

US – United States

WHO – World Health Organization

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RESEARCH OUTPUTS

Filipova, V. (2019, July 1). Health Warnings in Alcohol Advertising [Doctoral Colloquium presentation]. Academy of Marketing Conference 2019, London, United Kingdom.

Filipova, V. (2021, November 17). *The Impact of Health Warnings in Alcohol Ads: Comparing Text, Image and Multiple-Text Health Warnings on Alcohol Advertisements* [Webinar session]. UK-Ireland Alcohol Research Network. https://alcoholresearch-uk-irl.net/

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CHAPTER 1: RESEARCH CONTEXT

Research background, health warnings policy, objectives, thesis structure

1.1 Introduction

There has been a growing awareness of the negative impact of alcohol consumption on health (World Health Organization, 2021), yet despite this, consumers remain sceptical of the dangers associated with drinking alcohol, and many are not aware of the long-term health consequences of alcohol consumption (Bates et al., 2018; Buykx et al., 2015; Jane-Llopis et al., 2020; Kokole et al., 2021; Martin-Moreno et al., 2013; May et al., 2022; Morgenstern et al., 2021; Stockwell et al., 2020; Winstock et al., 2020). Scholars have proposed alcohol health warnings as a way in which health-related information can be communicated directly to consumers (Al-hamdani, 2014; Bowden et al., 2014; Critchlow et al., 2021; Critchlow & Moodie, 2022; Dimova & Mitchell, 2021; Hobin et al., 2020; Kokole et al., 2021; Miller et al., 2016; Stockwell et al., 2020; Vallance et al., 2020; Weerasinghe et al., 2020), and the European Commission has subsequently drafted a policy proposal for mandating alcohol cancer health warnings on product labels by 2023 (European Commission, 2021).

This call for research has been prompted by the large body of tobacco health warnings research, where it is well regarded that their use has generated success in enhancing positive behavioural responses in smokers and reducing overall tobacco consumption (Hammond, 2011; Hammond et al., 2013; Noar et al., 2017; Noar, Francis, et al., 2016; Noar, Hall, et al., 2016). Thus, a growing body of research into health warnings on alcohol products has emerged (for a review, see Dimova & Mitchell, 2021; Kokole et

al., 2021), however, little research to date has taken into account the efficacy of health warnings on alcohol ads (Critchlow & Moodie 2022; Dossou et al., 2017, 2020; Diouf & Gallopel-Morvan, 2020) and there are significant gaps in our understanding of health warnings in this context. This thesis thus evaluates the efficacy of health warnings on **alcohol ads** in changing consumers' cognitive and affective reactions.

To give context to the importance of alcohol health warnings, this chapter provides an overview of Irish and global alcohol consumption levels and the health-related harm associated with alcohol. The chapter also introduces the alcohol policy landscape in Ireland, the Public Health (Alcohol) Act 2018 and its relevance to this thesis, the aims and the research questions it seeks to address, and the current alcohol health warning policy environment for both health warnings on alcohol product labels and in alcohol ads. It then concludes with a summary of the thesis chapters and the overall structure of the dissertation.

1.2 Alcohol Use and Health-Related Harm

High-volume alcohol usage has long been regarded as a leading public health concern and has been linked to a broad range of individual health consequences and broader social harm (World Health Organization, 2021). Alcohol consumption is causally linked to more than 200 diseases, including cancer, liver cirrhosis, heart diseases, injuries, and mental health problems (OECD, 2022), and 3 million deaths per year worldwide are the result of alcohol consumption, with more than 5.1% of the global population diagnosed with alcohol-related disorders (World Health Organization, 2021). Given the proven link between cancer diagnoses and alcohol, this is particularly concerning in light of the

European Commission report, which highlighted that cancer will be one of the key causes of death in the European Union by 2035 (European Commission, 2021). Furthermore, Health at a Glance Europe 2021, drawing on country-specific data from 27 European countries, outlines that cancer is the leading cause of death in Ireland, with alcohol use being one of the key causes of cancer (OECD, 2021). Given these statistics, the damaging effect of alcohol on individuals' health cannot be underestimated.

In Ireland, alcohol has been a part of life and culture for centuries (Ferriter, 2015), and alcohol consumption remains high in the country (O'Dwyer et al., 2021), with one-quarter of adults consuming alcohol above the European Union average (OECD, 2021). In addition, there are almost 3 million drinkers in the overall Irish population, and binge drinking remains high, with 39.9% of Irish drinkers consuming more than six standard drinks on one occasion (Mongan et al., 2021). Underage alcohol consumption is also problematic, with 89% of those aged between 17 and 18 reported drinking at least once in their lives (Health Research Board, 2019).

A corollary to the excessive consumption of alcohol in Ireland is the significant contribution the alcohol industry makes to the Irish economy in the form of taxes, exports, wages, tourism, and employment (Foley, 2019). But again, the financial positives are offset by the high health services costs associated with problem drinking which is estimated to be 10% of the overall healthcare budget, with €1.5 billion spent on alcohol-related treatment in Irish hospitals (HRB National Drugs Library, 2021). Recent data also suggest that alcohol-related hospitalisations have increased over time, with chronic diseases accounting for 90.8 per 100 000 cases in 2018, indicating an increase of 221% compared to 10 years ago (HRB National Drugs Library, 2021). Out

of 6252 suicide cases, 31% were linked to alcohol in 2019, and 5824 individuals were reported as alcohol dependent in 2020 alone (HRB National Drugs Library, 2021). Furthermore, data from the National Study of Youth Mental Health report highlighted that many young adults who engage in excessive drinking could develop an addiction to alcohol in the future (Dooley et al., 2019). Overall drinking-related mortalities exceeded 10 000 between 2008 and 2017, meaning that 3.7% of all deaths were due to alcohol consumption (HRB National Drugs Library, 2021). Ireland is also over-represented in liver cirrhosis data accounting for four-fifths of all chronic alcohol diseases (HRB National Drugs Library, 2020). It is therefore critical that consumers are informed of the health impacts caused by drinking. This is particularly relevant to Ireland, where a significant step in this direction has already been made. The next section will provide a brief explanation of alcohol policy and the current health warnings policy landscape. It is in the following sections that the context of the current study is provided.

1.3 Self-Regulation Versus Population-Based Alcohol Policy Measures

While alcohol policy advocates argue for the necessity of population-based measures to prevent alcohol-related harm, alcohol industry players support targeted-based measures, including social norms campaigns, voluntary labelling, and responsible drinking campaigns (Jernigan & Ross, 2020). The overwhelming evidence on alcohol-related harm indicates there is a need for population-based measures involving three main strategic approaches, many of which face industry opposition: 1) general population interventions, 2) high-risk population interventions, and 3) environmental strategies (Berdzuli et al., 2020). Examples include treating alcohol consumption disorders,

increasing prices, reducing alcohol availability, and content and volume restrictions on alcohol marketing and advertising (Berdzuli et al., 2020).

Similarly, health warnings policy can be subjected to industry self-regulation or may be required by law. Voluntary agreements are generally initiated between governments and the alcohol industry (or the industry alone), with many European countries relying on agreements with the alcohol industry on health warnings use (World Health Organization, 2017). Others, however, require mandatory warnings based on national laws (Jane-Llopis et al., 2020). The following section describes Ireland's policy landscape, outlining the major developments throughout the years.

1.3.1 Irish Alcohol Policy Interventions

Alcohol policy has gone through several stages since the "Celtic Tiger" era, which in Ireland was from 1994 to 2004 (Butler & Hope, 2015). This period was characterised by high economic prosperity for the country and marked moves towards liberalisation with no legal, statutory limitations on alcohol marketing while, at the same time, there was significant industry growth and consumerism (Butler & Hope, 2015). Butler (2009) argues that this economic growth during Celtic Tiger times stimulated the consumption of alcohol (Butler, 2009), and the National Alcohol Policy Report prepared and launched by the Department of Health and Children in September 1996 was Ireland's first attempt to develop a national alcohol policy (Butler, 2009). While the report had a significant focus on public health, the lack of strong recommendations for actual implementation did not motivate the government to act towards a strict alcohol policy (Butler, 2015).

The Strategic Task Force published two reports in 2002 and 2004, including international and Irish evidence on alcohol-related harm and policy developments (Butler, 2009). However, the Liquor Licensing Commission was against state interference and in favour of free trade and liberalisation, with the first initiatives based only on licensing (Butler, 2009). The Minister for Justice enacted the Intoxicating Liquor Act (2008) with restriction proposals on sales, national retail hours, license controls, trading days, manufacturing, and distribution (Hope & Butler, 2010), although not all were approved by the Irish government (Butler, 2009).

The drinks industry and advertising organisations established the Central Copy Clearance Ireland [CCCI] in February 2003 and the Advertising Standards Authority for Ireland [ASAI] Voluntary Code came into effect in 2005. The Code is closely in favour of industry self-regulatory practice and reflects self-regulation marketing communications guidelines outlined by international industry organisations in Europe (Advertising Standards Authority for Ireland [ASAI], 2016). It was not before 2012, however, when the National Substance Misuse Strategy report marked an important move towards population-based measures against alcohol consumption (Butler, 2015) with a particular focus on a set of restrictions, including separation of alcohol products in retail premises, alcohol advertising restrictions and product labelling, ban on sponsorships, and minimum unit pricing (Lesch & McCambridge, 2022). Given the strong evidence about the risks of alcohol consumption and health-related costs linked to excessive drinking, in October 2013, the government released a response to the independent review of the National Substance Misuse Strategy Report commissioned by steering group experts (Butler, 2015; Lesch & McCambridge, 2021a). Driven by public health objectives, the steering group experts considered alcohol consumption a public

health concern for the first time in the policy context and recent advances in alcohol policy can be credited to the Public Health (Alcohol) Act (Lesch & McCambridge, 2021b).

Table 1.1

Key Alcohol Policy Activities

1996	National Alcohol Policy Report
2002	Strategic Task Force Report
2003	Central Copy Clearance Ireland. Alcohol Marketing Regulations
2004	Strategic Task Force Second Report
2005	Advertising Standards Authority for Ireland (ASAI) Voluntary Alcohol Marketing (Self-Regulation) Code
2008	Intoxicating Liquor Act (2008)
2012	Steering Group Report on National Substance Misuse Strategy
2018	Public Health (Alcohol) Act

Note. Adapted from Hope and Butler (2010), p. 491

This next section will discuss self-regulation responsibility messages in alcohol advertisements and will outline key changes under the Public Health (Alcohol) Act 2018 (hereafter the "PHAA").

1.3.2 Responsibility Messages in Alcohol Advertising

The Code of Standards for Advertising in Ireland closely reflects the self-regulation guidelines set out by international industry organisations in Europe and specifies that a responsibility message should be included in all marketing communications (Advertising Standards Authority for Ireland [ASAI], 2016). Two key associations represent the alcohol industry in Ireland: The Drinks Industry Groups of Ireland [DIGI] and Drinks Ireland (Lesch & McCambridge, 2022) with many associate members, including distributors, pub owners, retail sectors, and producers (Hope, 2006). Social organisations such as the Mature Enjoyment of Alcohol Society Limited [MEAS] introduced Drinkaware in 2006 (Lesch & McCambridge, 2022), with guidelines highlighting that responsibility messaging "Enjoy [brandname] sensibly. Visit drinkaware.ie" should be included in all traditional and digital marketing communications (MEAS, 2013). "As a general rule, any marketing material that is produced for a product or brand should also feature appropriately constructed, positioned and sized responsibility messaging." (MEAS 2013, p.1).

Existing research suggests that there are several reasons to be concerned about self-regulation and responsibility messages in particular. For instance, a recent study suggests that the message "get the facts. DRINKAWARE.ie" is not always present in social media alcohol ads, and if present, these voluntary messages have limited design elements (Critchlow & Moodie, 2022). While there is considerable concern about the impact of alcohol consumption on public health, informing consumers about the risks of alcohol consumption through voluntary codes maintained by the alcohol industry has not been sufficiently adequate in making alcohol less appealing or informing consumers

about alcohol-related harm in Ireland (Critchlow & Moodie, 2002). The limitations of existing voluntary drink-responsible messages have led to calls for mandatory health warnings on products (Critchlow et al., 2021) and advertising (Critchlow & Moodie, 2022), and the inadequacy of self-regulatory messages is further discussed in Chapters 2 and 3 Sections 2.5.2 and 3.4.1.

1.3.3 The Public Health (Alcohol) Act 2018

The PHAA was introduced in 2015 and was passed by the Oireachtas in 2018 with a set of comprehensive measures intended to work together in reducing harmful alcohol consumption, including minimum unit pricing, sales and supply of alcohol products, product labelling, multiple health warnings, and restrictions on alcohol advertising and sponsorship (Oireachtas, 2018). This legislation is a comprehensive and strong policy aimed at minimising the problem of alcohol consumption in the country. Alcohol products on retail premises have been separated since November 2020, restrictions on sponsorship of children's events were introduced in November 2021, and minimum unit pricing was introduced in January 2022 (Health Service Executive [HSE], 2022).

Section 13 of the PHAA. Central to this research is one component of Section 13 of the PHAA, which will require multiple health warnings to be placed on all alcohol ads, namely a warning about the harmful effects of alcohol, a warning on the dangers of drinking during pregnancy, and a warning on the causative link between alcohol consumption and cancer. It also mandates the inclusion of information on an independent health services website where consumers can access more detailed drink awareness advice and support (Oireachtas, 2018). It is the Minister for Health who shall

decide on their design (Oireachtas, 2018); however in June 2022, the warning features proposed in Draft Regulations under Section 12 of the PHAA may also be utilised for health warnings in alcohol ads. These are "drinking alcohol causes liver disease," a pregnancy pictogram, "there is a direct link between alcohol and fatal cancers," and a health services website providing public health information www.askaboutalcohol.ie (Alcohol Action Ireland [AAI], 2022).

Alcohol advertising content restrictions and health warnings on alcohol ads (under Section 13 of the PHAA) are yet to commence. According to the Minister for Health, "work on commencement of these sections of the Public Health (Alcohol) Act was suspended throughout 2020 and much of 2021 due to resources being diverted to COVID-19 related areas; that work has now restarted" (Oireachtas, 2022). It is expected that the Irish government should notify the European Commission of the draft advertising regulations under Sect. 13 of the PHAA, although the timeframe for this assessment is yet to be confirmed (Oireachtas, 2022).

The enforcement of the Irish legislation has not been without challenges. A three-year delay resulted from industry interference, especially concerning sponsorship restrictions and minimum unit pricing (Lesch & McCambridge, 2021a). The PHAA was opposed through "three interrelated tactics used by the alcohol industry: obstruction through participation, coalition building, and well-resourced lobbying" (Lesch & McCambridge, 2022, p.578). Opposition by the industry was also evident with respect to product labelling and cancer warnings. The results of a research study conducted by Vallance et al. (2020) showing an increased industry interference with alcohol product labelling in Ireland were published. The findings of this study clearly outline the perspective of the

alcohol industry and how their arguments opposing product labelling and cancer warnings were most commonly featured in media (Vallance et al., 2020). According to the alcohol industry, there is no serious evidence that alcohol consumption is associated with fatal cancers, claiming that the implementation of cancer warnings is not a justifiable requirement and product labelling was almost immediately delayed (Vallance et al., 2020).

Despite this, the prominent position of the Irish government is that stronger alcohol policies are needed to address alcohol related-harm in the country. Lesley and McCambridge (2021a) examined the role of public health advocacy in shaping alcohol policy and conducted a thematic analysis examining a large volume of policy documents, articles, newspapers, and interviews in the context of the PHAA. Their findings suggest that public health advocates play a central role in achieving public health benefits, and despite industry lobbying, the focus on alcohol-related harm as a strategic message involving not only political groups but the general public was a key factor in enforcing the legislation.

Furthermore, it has been argued that increased political knowledge contributed to successful campaigning (Lesley & McCambridge, 2021a). Data from 20 interviews with public health advocates indicates that the policy landscape in Ireland has substantially changed due to public support and attention to alcohol harm, political action, and policy developments (Lesch & McCambridge, 2021b). The authors viewed those in the form of three streams: the political stream, the problem stream, and the policy stream, all of which have been sufficiently adequate in promoting the PHAA and indicating that political leadership is required (Lesch & McCambridge, 2021b). Thus, political support

for alcohol control policies holds international value, and the proposed restrictions under the PHAA are one of the changes needed to reduce alcohol-related harm in Ireland (O'Dwyer et al., 2019).

In addition, it has been argued that Ireland's requirement for content-specific health warnings is likely to stimulate other European governments to implement similar initiatives (Stockwell et al., 2020), in the same way Ireland was the first country in the world to ban indoor smoking. In this regard, Stockwell et al. (2020, p. 290) noted that "Ireland, in particular, has the opportunity to lead the way with *evaluations of mandated health warnings* [emphasis added] that provide clear and impactful information to consumers."

1.4. Thesis Aim and Research Objectives

The overarching aim of this thesis is to investigate consumer reactions to alcohol advertising health warnings among adults in Ireland. Critchlow and Moodie (2022) have called for more research on health warnings in alcohol marketing, as this is an important area that will profit from future experimental research in investigating consumer reactions to mandatory health warnings according to Sect 13 of the PHAA. Indeed, the existing alcohol policy landscape in Ireland has informed the current study and not only addresses Critchlow and Moodie's (2022) call for future research on mandatory health warnings in the context of alcohol marketing but also sheds light on the role of alcohol ad content in examining consumer reactions to health warnings in alcohol ads.

This thesis presents a single-study experimental investigation which examines the impact of three warning design features in alcohol ads. The aim of the study is to evaluate the health warnings component of Section 13 of the PHAA on consumer cognitive and affective reactions and did not aim to examine the full potential of the legislation. While the study considers the role of ad content as a moderator, it does not capture a broad range of ad-related outcomes, including ad appeal and brand salience. As the brand which featured in the advertisement stimulus is not an existing brand (Blue Wave), it was not necessary to test for potentially confounding variables such as brand attractiveness and salience as the study participants would not have previously held beliefs for this particular product. this aim. The research limitations of this approach are outlined in Chapter 7 Section 7.5. and suggestions for further research are provided in Section 7.6.

Next, direct effects of health warnings in the form of measures of actual behaviour are not sought here for methodological reasons, and it is known that health warnings can induce positive cognitive, affective, and behavioural reactions in consumers (Argo & Main, 2004; Dimova & Mitchell, 2021; Hassan & Shiu, 2018; Kokole et al., 2021; Laughery & Wogalter, 2006; Moodie et al., 2010; Noar, Hall, et al., 2016; Wogalter, 2018). Therefore, rather than focusing on a single outcome, this research examines a range of outcomes and tests the differences between multiple-text, single-text, and image-and-text health warnings on consumers' cognitive and affective reactions. These new warnings have not been explored in this context, nor have they been tested on alcohol products. Given this, the following research question contributes to achieving the aim of this thesis:

What impact does viewing multiple-text, single-text, and image-and-text alcohol advertising health warnings have on consumer cognitive and affective reactions?

In addition, the study seeks to determine whether an alcohol ad with social imagery portraying people drinking alcohol will decrease the impact of health warnings and what interactions will an alcohol ad with social imagery has with warning designs (multiple-text, single-text and image and text) in regard to consumer reactions to them.

The objectives of this thesis are as follows:

- to compare the impact of alcohol ads with multiple-text, single-text and image-and-text health warning designs on consumer reactions in terms of their:
    - recall of health warnings
    - propensity to believe health warnings
    - negative emotions
    - perceived personal risks of alcohol use
    - knowledge of the health effects of alcohol
    - self-efficacy to drink less
- to investigate if social imagery content compared to product-related content in alcohol ads decreases the impact of health warnings

Reflecting on the core purpose of the study, which is to examine consumer cognitive and affective reactions to alcohol ads, the influence of social imagery ad content

becomes a subordinate objective within this aim. Nevertheless, the findings of this study will offer a number of significant public health implications, particularly as Ireland moves towards the use of mandatory and multiple health warnings in alcohol advertisements.

1.5 Overview of Alcohol Health Warnings Policy in Other Countries

In the following sections, the current policy landscape in terms of health warnings use on both products and alcohol advertising is considered. The sections within the current chapter do not attempt to review the literature on health warnings but seek to highlight the innovativeness of the measures under Section 13 of the PHAA.

1.5.1 Learning from Tobacco

Tobacco health warnings may be used as a guide in formatting alcohol health warnings, as they have a long history spanning several decades of development (Noar et al., 2017; Noar, Francis et al., 2016). Progress in this area has evolved from the first legislated tobacco health warning which simply stated "Cigarette smoking may be hazardous to your health" (Fox et al., 1998) to the much more radical and stringent strategies of today, which include shocking imagery and detailed information on the negative health effects of smoking (Hammond, 2011). The overall development stages for tobacco health warnings can be viewed as follows:

- vague and small health warnings on the side of cigarette packs
- slightly larger text health warnings on the front of cigarette packs

- health warnings relating to *specific* [emphasis added] tobacco-related diseases, such as cancer, placed on each side of the cigarette packs
- larger, multiple, and rotating health warnings with shocking images and different image intensity levels across countries
- tobacco plain packaging with large and specific health warnings (Noar, Francis et al., 2016)

The progress made with the use of tobacco health warnings is based on the stages mentioned above, with several decades of legislative control measures and strong scientific evidence to reduce tobacco consumption across the globe (Brewer et al., 2019; Gallopel-Morvan, 2015; Hammond, 2011; Moodie & Hastings, 2010; White et al., 2015; World Health Organization, 2014). Moreover, these comprehensive measures are not limited to health warnings but also account for global bans on cigarette advertising, sponsorship, and promotion as part of the WHO Framework Convention on Tobacco Control (Freeman et al., 2022).

1.5.2 Health Warnings on Alcohol Products

The United States was the first country to legislate for health warnings on this product category with the Alcohol Beverage Labelling Act of 1988 (Andrews & Netemeyer, 1996; Greenfield et al., 1993), which focused specifically on health warnings on physical products (i.e. not advertising). The health warnings were used to inform the public against the danger of excessive drinking with two warnings about pregnancy and alcohol consumption while driving (Andrews & Netemeyer, 1996; Greenfield et al., 1993) and remained the same for many years without significant changes to their

content or design (Martin-Moreno et al., 2013). As the US were at the forefront of health warning initiatives, much of the early data originates from there. A review of these studies is provided in Appendix G.

Although policy discussions around health warnings use have been raised in recent years, non-European and European regions demonstrate different stages of progress in terms of their use, and in general, Europe appears to lag behind many other regions. Indeed, a report by the World Health Organization found that 44% of countries outside of Europe require health warnings on alcohol products in comparison to 28% of states in the European Region and 14% of Member states in the European Union (Jane-Llopis et al., 2020). Russia implemented their first health warning policies in 1995, and since then, have made a number of amendments, and with each development their warnings have become more specific and severe. Thailand is often referenced as a good example of innovative alcohol policies, with its first alcohol product warning introduced in 2008 as part of their Alcohol Beverage Control Act and with more recent amendments following in 2015 (Kaewpramkusol et al., 2019; Martin-Moreno et al., 2013). Examples of Thai health warnings on alcohol products include “Drinking may cause cirrhosis and sexual impotence,” “Drunk driving may cause disability or death,” and “Drinking may cause less consciousness and death” (International Alliance for Responsible Drinking [IARD], 2019), which illustrates they are content-specific and emphasise particular serious health risks associated with alcohol consumption. More recently in 2016, South Korea began to initiate similar policies through the introduction of warnings which read “excessive consumption of alcohol may cause cancer” (Stockwell et al., 2020).

Although a serious campaign exists within Europe to introduce more prominent and specific alcohol health warnings on products (European Alcohol Policy Alliance [Eurocare], 2014; European Commission, 2021; Jane-Llopis et al., 2020), apart from Ireland, many countries have not acted on this. Up until this point, the most common health warnings on alcohol products remain those related to pregnant women, minors, and drivers and have not reduced alcohol consumption as they were intended (Eurocare, 2014; Jane-Llopis et al., 2020; Martin-Moreno et al., 2013). However, this will likely change with the European Commission's plan to implement mandatory cancer warnings on alcohol product labels. It is expected that there will be a move away from voluntary agreements, with a recent report published by the World Health Organization (2020) which recommends that health warnings must be required by law and calls countries to consider the implementation of cancer and pregnancy health warnings, with clear and standardised presentation guidelines (Jane-Llopis et al., 2020). The PHAA (2018) brings Ireland closer to these recommendations and it is expected that interest in alcohol health warnings will gain further traction in the coming years.

1.5.3 Alcohol Advertising Health Warnings

Approximately 58 member states worldwide require some form of health warnings to feature in alcohol ads. However, as is the case for alcohol products, advertising health warnings are very inconsistent across countries. Health warnings in alcohol ads tend to include relatively general statements about the danger of drinking alcohol on health, such as that seen in the United States, "Alcohol consumption may cause health effects" (World Health Organization, 2017) and do not specify the nature of the ill health effects or the specific diseases alcohol consumption has been causally linked to. Ireland is

unique in this regard as although other European countries legally require alcohol advertising warnings (World Health Organization, 2022), no country has mandated for multiple warnings in alcohol ads and instead have opted for more generic, general statements such as “alcohol can be dangerous to your health.” Another example of which is France’s very generally worded warning, “Alcohol abuse is harmful,” a warning that is occasionally supported by a voluntary “drink with moderation” message (Dossou et al., 2017).

Table 1.2 provides a description of countries with existing mandatory and voluntary alcohol advertising health warnings in Europe according to the most recent data published by the International Alliance for Responsible Drinking [IARD] (2021) and the European Centre for Monitoring Alcohol Marketing [EUCAM] (2022). As the scope of the current chapter is introductory in nature and deals with the policy environment of alcohol health warnings, evidence of the effectiveness of alcohol advertising warnings can be found in Chapter 3.

Table 1.2

European Countries with Alcohol Advertising Health Warnings

Country	Health Warning Requirements
Belgium	Self-regulatory with “Beer brewed carefully, to be consumed with care” depending on product type.
Estonia	Article 28 of the Advertising Act requires all alcohol ads to include “Alcohol may cause damage to health”, and the warning occupies 20% of the ad space.
France	The Loi Evin Law requires all alcohol ads to include a warning “alcohol abuse is

	harmful to health" and may include a pregnancy pictogram.
Greece	Self-regulatory with drink responsible messages.
Ireland	The PHAA(2018) requires four content-specific health warnings in alcohol ads.
Latvia	The Alcohol Act requires all alcohol ads to include a general warning of the negative effects of alcohol consumption, occupying 10% of the ad space at the bottom of the ad.
Lithuania	Article 29 of the Alcohol Control Law requires a general health warning of the harmful effects of alcohol consumption on outdoor advertising.
Netherlands	Self-regulatory. Alcohol ads to contain "No 18, no alcohol" or "drink with moderation."
Poland	Article 13.5 of the Alcohol Act requires a general warning about the health harm of alcohol consumption covering 20% of the ad space and accompanied by the statement "sale of alcohol products is prohibited to minors"
Romania	Article 21 of the Federal Law requires a general warning about the harm of excessive consumption occupying at least 10% of the ad space.
Serbia	Article 49 of the Advertising Law requires a warning for children and the responsible use of alcohol and may include pictograms.
Slovenia	The Act requires a warning of the general effects of alcohol consumption, "The Minister of Health warns: Consumption of alcohol may be harmful to your health!"
Spain	Self-regulatory with responsible drinking messages including "drink with moderation."
Sweden	The Alcohol Act requires text-only health warnings only for print alcohol ads occupying 20% of the ad space. Unfortunately, no information is available on the exact wording.
Ukraine	Article 22 of the Advertising Act requires a general warning of alcohol-related harm, "Alcohol abuse causes damage to your health."
United Kingdom	Self-regulatory. Article 4.6 suggests a warning on the dangers of alcohol consumption while driving.

Note. Adapted from the International Alliance for Responsible Drinking (IARD, 2021) and the European Centre for Monitoring Alcohol Marketing (EUCAM, 2022).

Despite the existence of Ireland's PHAA and the legal requirement for alcohol advertising health warnings across a significant number of European countries, no previous studies (published in English) have examined the impact of these health warnings on awareness, knowledge, intentions and consumer behaviour. Ireland's Act is particularly groundbreaking as it goes over and above other states' requirements in specifying for the inclusion of a number of health warnings, one of which refers to the link between drinking alcohol and cancer. Moreover, even less is known about the effects of multiple health warnings or the effect cancer-focused warnings may have on key precursors to consumer behaviour. This dissertation addresses this important gap in the literature and seeks to demonstrate which combination of health warnings is best placed to modify consumer reactions, which is of significant importance to alcohol health warning policy in this area.

1.6 Outline of Chapters

This dissertation is organised as follows:

The literature review is divided into two separate chapters. Chapter 2 provides the foundation for examining consumer reactions to health warnings in alcohol ads and is organised into four sections: It first focuses on the use of fear appeals as a communication tool and then presents the theoretical underpinnings of how health warnings influence key precursors to consumer behaviour by emphasising several integrated fear appeal theories as part of the persuasion process. Following this, a review of studies that have been conducted on health warnings in the context of products is presented, as very limited research to date has focused on alcohol

advertising health warnings. It finally concludes with a comprehensive overview of the role of health warning designs in influencing the effectiveness of health warnings, including their format, wording and overall design characteristics.

The third chapter continues with an overview of how health warnings might advance their theoretical understanding and extends the literature review to not only research on product health warnings but to how health warnings in *alcohol ads* might be processed and under which conditions the content of alcohol ads have an impact. To achieve this, the first half of the chapter provides a brief overview of the impact of alcohol advertising on drinking behaviour and the persuasive nature of alcohol ad content by highlighting the prevalent use of social cues in alcohol advertising. The theoretical implications of this are then discussed through the lens of a dual-process theory that deepens our understanding of how health warnings in alcohol ads work and whether social imagery would likely decrease the effectiveness of health warnings. The remainder of the chapter focuses solely on previous studies of health warnings in ads based on different domains, followed by a brief overview of the limited literature on health warnings in *alcohol ads*. Studies in which ad content has been shown to influence consumer responses to health warnings are also discussed.

Chapter 4 follows the literature review and presents the research gaps that this study aims to address and the potential impact of three different health warning designs on six dependent variables: recall and believability of health warnings, negative emotions, perceived personal risks of alcohol use, knowledge of the health effects of alcohol, and self-efficacy to drink less. The study offers three research propositions that are built

upon studies of health warnings on products and leads to a number of hypotheses, which also are based on the health warnings literature.

Chapter 5 focuses on the methodological decisions underpinning this thesis. It begins with an introduction to the research design, and a rationale for conducting a between-subject factorial experiment is provided. It then presents the design and development of the experiment stimuli, with a detailed illustration of the selection of health warnings and alcohol ads included in the study design. This is followed by a discussion on questionnaire development and specific issues related to it, cognitive interviews, sample decisions, measurement scales used for data collection, participant recruitment, and the statistical strategies employed to test the study hypotheses.

Chapter 6 details the stages of the data analysis and the key results from the between-subjects factorial survey experiment based on the hypotheses presented in Chapter 4. Within this chapter, data from the study are organised and reported in two major sections: Data preparation and results. The statistical methods adopted include, multinomial regression analysis, multivariate and univariate analysis of variance and covariance. The chapter then concludes with a detailed summary of the results.

Chapter 7 provides a comprehensive discussion on the theoretical implications of the study results in relation to previous literature and discusses how this research has added to the wider health warnings research evidence evaluated in Chapters 2 and 3. It then discusses the study limitations and avenues for further research in the area and ends with the practical implications of the study findings in relation to alcohol health warnings policy and practice.

CHAPTER 2: A REVIEW OF HEALTH WARNINGS, THEIR THEORETICAL MECHANISMS, OUTCOMES, AND CONTEXTUAL FACTORS

Fear appeals, alcohol health warnings, outcome measures

2.1 Introduction

Health warnings research has gained traction in recent years, with researchers examining whether they influence consumer behaviour and the mechanism through which they work. The literature base is quite diverse and ranges from studies on industry-sponsored drink responsible messages on alcohol products (e.g., Coomber et al., 2015, 2018; Critchlow et al., 2020; Jones et al., 2021; Kersbergen & Field, 2017a; Pham et al., 2017; Roderique-Davies et al., 2020) to those studies that have tested emotive text or imagery relating to different health diseases (e.g., Dimova & Mitchell, 2021; Gallopel-Morvan et al., 2011; Gold et al., 2020; Hammond, 2011; Jones et al., 2022; Moodie et al., 2010; Sillero-Rejon et al., 2018). The outcomes also vary with studies that have examined the short-term effects of health warnings on psychological outcomes, such as emotions, attitudes, and intentions (for reviews, see Dimova & Mitchell, 2021; Kokole et al., 2021; Hassan & Shiu, 2018), and others that have attempted to examine the real-world impact of health warnings through assessing their effect on recall, awareness and knowledge, although they are significantly more limited (Hobin et al., 2020; Weerasinghe et al., 2020; Zhao et al., 2020). In this regard, it appears that the effects of health warnings can be examined through health warning designs, recall, awareness, psychological variables (e.g., cognition and affect), and

moderators such as demographics and individual-level characteristics (Kokole et al., 2021).

This chapter provides a theoretical basis for the measures utilised to examine the impact of alcohol advertising health warnings on cognitive and affective reactions and is divided into four sections. First, an overview of how fear is used in marketing and health communication research is provided. Second, four theoretical frameworks that have been widely utilised to explain the efficacy of health warnings are presented. Third, studies that have examined health warnings on various outcomes as antecedents of consumer behaviour are discussed. The chapter then concludes with a review of health warning designs, including their type, size, colour, location, and content.

2.2 Fear Appeals as a Communication Tool

Fear is a tool frequently used to incite behavioural change in social marketing campaigns where shocking images and messages are used as a means of warning consumers about various health harms. . Fear itself is an emotion, generally understood to mean a negative feeling in response to danger, whereas *fear appeal* is a communication technique (Rogers, 1983). It is broadly defined as a message containing emotion-evoking content that is typically negative, warns against danger, and takes the form of written or visual information (Witte, 1992).

In order to understand how health warnings work, it is important to consider that they are often based on evoking a reasonable level of anxiety through fear, and as such, the use of fear has become an increasingly useful concept among public health specialists

and regulators who seek to increase the efficacy of health warnings. The growing interest in fear when developing health warnings is mainly due to the increased use of image-based warnings illustrating shocking images as a means of warning consumers about health harms and are particularly well-known for their presence on tobacco packaging (Gallopel-Morvan et al., 2011).

In addition, although the issue of excessive alcohol consumption has more commonly been examined through the lens of rational-based theories rather than theories based on emotions, drinking alcohol involves both pleasant and unpleasant experiences, and these emotional responses play a key role in influencing drinking behaviour (Previte et al., 2015). The following section provides an overview of the use of fear in the context of health communication and marketing research.

2.2.1 Positive Effects of Fear Appeals

The concept of fear appeals has been extensively discussed in marketing research with studies dating as far back as the 1970s examining how fear can be used in advertising to persuade viewers to buy products (Spence & Moinpour, 1972). Early evidence found that fear appeals had positive effects on learning, attention, and action toward the recommended behaviour (Ray & Wilkie, 1970) and that their use enhances message persuasion (Sternthal & Craig, 1974). Fear appeals can also influence brand, ad-related attitudes, and perceptions (Snipes et al., 1999), with shocking content embedded in ads more likely to evoke greater attention than non-shocking ads (Dahl et al., 2003). Furthermore, a longitudinal study with a randomised experiment examined the differences between long-term and short-term risks of tobacco consumption featured on

antismoking ads (Smith & Stutts, 2003), with findings suggesting that antismoking fear-related ads featuring both long- and short-term health risks were equally effective. However, women were found to be more sensitive to fear appeals focusing on long-term health consequences than men (Smith & Stutts, 2003).

Other research has demonstrated the impact of fear appeals in the context of green marketing, with social media fear messages more likely to generate higher engagement and individual thought about environmental issues and green consumption (Pittman et al., 2021). Furthermore, two other studies found that fear appeals about climate change increased risk perceptions (Skurka et al., 2018), and policymakers, advertisers, and politicians believe that using fear appeals can increase perceived risk beliefs (Peters et al., 2014). This is one of the reasons their use is particularly relevant to social marketing (Stefan, 2012), which is aimed at reducing risky behaviour and is intrinsically linked to drug, tobacco use, alcohol use, and eating disorders (Morales et al., 2012).

There is evidence that fear appeals are effective and that policymakers should continue to invest in fear-focused interventions due to their positive effects on a range of different behaviours (White & Albarracín, 2018). The rationale for using fear appeals is to illustrate that some behaviours can lead to bad outcomes; therefore, changing behaviour can prevent these negative outcomes. More positive support for the effectiveness of fear was also demonstrated in a meta-analysis study, with 127 papers focusing on fear communication research, and with overall findings suggesting that fear appeals can influence attitudes and intentions (Tannenbaum et al., 2015)

Finally, it also appears that the effectiveness of fear appeals is moderated by individual-level characteristics, particularly in marketing contexts, with individuals who are high in self-esteem and low in perceived personal relevance more likely to be influenced by fear communication (Ray & Wilkie, 1970; Sternthal & Craig, 1974). This suggests that exposure to fear appeals has a positive effect on persuasion. However, the effect depends on other factors and the following section addresses other possible moderators and outcomes associated with the use of fear appeals in marketing and health communication.

2.2.2 Critique of the Use of Fear Appeals

As an antithesis to the positive effects of fear described in the previous section, other scholars argue that fear messages do not represent an adequate and realistic approach to changing behaviour (Hastings et al., 2004), as people often continue to engage in risky behaviours such as smoking, despite positive intentions to quit and knowledge that smoking is harmful (Hastings & MacFadyen, 2002). In particular, Hastings and colleagues (2004) question the effectiveness of fear appeals in real-world social marketing campaigns and argue that cognitive factors are more strongly associated with changes in behaviour (Hastings et al., 2004).

Furthermore, the social and marketing context influencing consumer behaviour should also be recognised when using fear appeals (Hastings & MacFadyen, 2002). To reflect this, Hastings and MacFadyen (2002) recommend that fear messages should not portray highly threatening content, nor should they evoke strong negative emotions. Instead, messages should present positively framed information or possibly support-related

alternatives such as response-efficacy messages or social marketing campaigns (part of a broader health promotion strategy) focusing on the experiences of non-users that should be used to facilitate behavioural change. Although Hastings and MacFadyen's paper highlighted some relevant recommendations—mainly the argument that fear communication must be balanced—their review was met with some criticism (for a review, see Biener & Taylor, 2002). For instance, Biener and Taylor (2002) argue that focusing on campaigns related to the benefits of a healthy lifestyle is not realistic, and the focus should rather be on the negative consequences associated with the individual behaviours of users. In addition, demanding a change of multiple behaviours, simultaneously to achieve a healthy lifestyle, may lead to adverse outcomes and dangerous behaviour such as smoking need to be addressed independently of other behaviours (Biener & Taylor, 2002).

Other scholars also argue that fear may create barriers to behavioural change and lead to defensive reactions (Ten Hoor et al., 2012; Kok et al., 2014, 2017; Van't Riet & Ruiter, 2013; Ruiter et al., 2001, 2014; Steindl et al., 2015; Witte, 1992), and individuals engaged in risky behaviours are naturally inclined to react defensively via a phenomenon described as reactance towards high fear (Brehm, 1966). Reactance theory (Brehm, 1966) has been used to explain the occurrence of maladaptive responses and why fear appeals do not always prevent risky behaviours (for a review, see Ruiter et al., 2001). The term reactance relates to defensiveness and has been used to address the issue of freedom of choice, especially when people feel threatened—depending on the type of threat, the characteristics of freedom, and the behavioural context (Brehm & Brehm, 2013). Researchers have identified two key constructs of reactance: Trait reactance and psychological (state) reactance, the latter of which is defined as reactance

towards threatening content and is relevant to the health warnings literature (Hall et al., 2016). Reactance has most commonly been examined in the context of anger related to restrictions that contrast with individuals' beliefs and perceptions, which lead to defensiveness toward and avoidance of the persuasive message (Brown, 2001). In their review of fear appeal messages in advertising, Brown (2001) found that highly threatening content was associated with reactance and message avoidance, with similar conclusions drawn by studies examining defensive responses to anti-alcohol (Brown & Locker, 2009) and antismoking messages (Brown & Smith, 2007).

However, reactance has also been associated with high personal involvement with risky behaviours and does not always occur based on high fear alone (Brehm, 1966). Therefore, fear appeals are not the single cause of reactance (De Meulenaer et al., 2015), and through the lens of reactance theory, it seems that individuals who consume alcohol are expected to be more likely to disagree with antidrinking messages as alcohol consumption is relevant to them. Other relevant constructs that determine the level of reactance are demographic and cultural characteristics (De Meulenaer et al., 2015; Mackinnon & Lapin, 1998; Morales et al., 2012; Tannenbaum et al., 2015), and it is noteworthy that, in some cases, researchers do not distinguish between avoidance, reactance, defensive responses, and denial. These constructs are often combined when defining consumers' defensive reactions toward health information (Van‘t Riet & Ruiter, 2013). However, although reactance theory can somewhat explain defensive reactions, researchers should consider these constructs as distinct set of outcomes (Van‘t Riet & Ruiter, 2013).

From the above, it is evident that fear can be persuasive; but reactance can also be formed under strong feelings of fear. Although fear appeals to encourage change in behaviour have been criticised, it is important not to neglect that fear appeals take different forms, and health warnings can be seen as a way to protect consumers and prevent risky behaviours, not only change risky behaviours. Hence, a broad distinction can be made between using fear with the aim to change behaviour and using fear to prevent risky (unhealthy) behaviours.

The following section provides more clarity with respect to how fear works and why health warnings can either be accepted (e.g., positive responses) or rejected (e.g., avoidance and reactance responses). Four commonly cited theories in the health warnings literature are described as they highlight the importance of fear appeals in modifying cognitive and affective reactions in consumers.

2.3 Theoretical Frameworks

There are a number of sociological and psychological theories that attempt to explain human processing of information and subsequent reactions, for example, social cognitive theory [SCT] (Bandura, 1999), the theory of planned behaviour [TPB] (Ajzen & Fishbein, 1980; Ajzen, 1991), and the health belief model [HBM] (Janz & Becker, 1984). These theories suggest that knowledge, risk beliefs, self-efficacy, social norms and intentions predict consumer behaviour and decision-making, yet they do not account for the possible effects of fear in health communication and marketing. Given that health warnings deal with the issue of fear, researchers in this area have primarily drawn on fear appeal theories, particularly the constructs contained in the drive theory

(Janis & Feshbach, 1953), the parallel process model [PPM] (Leventhal, 1971), the extended parallel process model [EPPM] (Witte, 1992), and the protection motivation theory [PMT] (Rogers, 1975).

2.3.1 Drive Theory

The earliest theory which sought to explain fear appeals is that of Janis and Feschbach's (1953) drive theory, who found an inverse association between intense fear and persuasion. In other words, high fear reduces the value of the message and leads to lower personal motivation to act based on the information contained in that message. However, subsequent research did not find support for this claim with the majority of studies highlighting a positive relationship between fear appeals and persuasion, indicating that fear is an important route to attitude formation and behavioural change (Tannenbaum et al., 2015).

These mixed findings have led to the emergence of two prominent theoretical assumptions associated with fear. While both models discuss fear as a source of motivation, the *linear model* suggests that high levels of fear have a positive effect on persuasion, attitudes, and motivation to change behaviour (Witte & Allen, 2000), whereas the *curvilinear model* suggests the opposite, with fear increasing message rejection and avoidance behaviour (Tannenbaum et al., 2015).

2.3.2 Parallel Process Model

The parallel process model [PMT] is a dual-process model that highlights two mechanisms through which individuals respond to fear in health communication research. According to Leventhal (1970), these are “danger control” and “fear control” processes that can sometimes occur simultaneously. Fear control involves emotions and seeks to reduce fear, whereas danger control refers to one’s ability to control the danger itself, with the latter more likely to bring behavioural change (Witte & Allen, 2000). Danger control will be triggered if an individual feels threatened but are in a position to reduce the danger. For instance, people process information via the danger control route when they consider the threat and have the ability to find ways to overcome the threat through changing their attitudes and behaviours (Leventhal, 1970). However, if the perceived threat is too high,feelings of fear are also high but self-efficacy is low, individuals are placed in a fear control statewhich is a process more commonly associated with reactance (Witte & Allen, 2000).

The defensive mechanism at work here depends on the level of fear induced by the appeals. For example, a death warning is likely to put individuals in the fear control state; however, a meta-analysis study did not find evidence that strong fear appeals lead to different outcomes than moderate fear appeals and that there is no uniform definition of what constitutes high and low levels of fear, which is a significant limitation in the fear appeals literature (Tannenbaum et al., 2015). It appears that the mechanism of fear appeals influence is not just based on the levels of fear but other factors that may contribute to their effectiveness, as suggested by theories that are discussed next.

2.3.3 Protection Motivation Theory

The protection motivation theory [PMT] examines the cognitive process by which fear appeals impact persuasion and cognitive reactions rather than fear-arousals alone (Rogers, 1983). Changes in cognitive and behavioural responses have been suggested to represent individuals' thoughts and motivations to manage the danger, especially as people are typically motivated to protect themselves from psychological and physical threats (Rogers, 1983). In the context of health warnings, the design features can influence consumers' cognitive reactions to a perceived threat, and an individual with stronger motivation to reduce the threat is more likely to find the fear appeal effective and comply with the recommended behaviours.

Response to a threat is based on two mediating conditions required to generate behavioural change: threat and coping appraisals where threat appraisals are perceptions of the threat, and coping appraisals are one's assessment of how the individual can manage the threat (Rogers, 1983). Four key variables related to threat and coping appraisals mediate individuals' responses to threat messages, namely the severity of harm, susceptibility, response-efficacy, and self-efficacy—all of which are variables that have been investigated in the literature on health warnings (Rogers, 1983). Severity refers to the perceived seriousness of harm (e.g., drinking behaviour leads to cancer), whereas susceptibility reflects the likelihood that harm will occur (e.g., you are at risk of cancer because you drink; Witte, 1992). Response-efficacy and self-efficacy refer to the importance of preventing harm by focusing on the positive outcomes (e.g., the benefits) of avoiding a particular behaviour (response-efficacy) and one's ability to cope with the recommended behaviour (self-efficacy); both high response-efficacy and self-

efficacy increase the likelihood that one will engage in protection motivation (Rogers, 1983), which refers to danger control responses as articulated by Leventhal (1970). The effects of these variables have been assessed in the literature on health communication with threat appraisals consisting of severity and susceptibility and coping appraisals referring to self-efficacy and response-efficacy (Rippetoe & Rogers, 1987). Applying this to the health warnings literature, it appears that fear appeals (a warning focusing on the negative consequences of a particular behaviour) may be supported with a response-efficacy message focusing on the benefits of quitting (Gallopel-Morvan et al., 2011).

According to the PMT, behavioural change is activated by protection motivation (rather than fear alone), whereas motivation is driven by coping and threat appraisals, namely the four variables mentioned above (Rogers, 1983). Furthermore, Rogers (1983) regards self-efficacy as a critical variable to the overall model, arguing that if self-efficacy is low, an individual's intentions to follow the proposed recommendations would also be limited (Rogers, 1983). With regard to threat appraisals, the PMT was further developed to create a clear distinction between adaptive and maladaptive responses, with the former more likely to occur when the perceptions of risks (severity and susceptibility) are high, and the benefits of engaging in a particular behaviour outweigh the perceived threat (Rogers, 1983).

2.3.4 Extended Parallel Process Model

The extended parallel process model [EPPM] (Witte, 1992) is one of the most cited theoretical models in research on health warnings as it highlights the conditions under which fear appeals are likely to lead to adaptive behavioural, attitudinal and intentional

responses (Maloney et al., 2011). The model suggests two possible outcomes in response to fear with fear appeals effectively increasing persuasion and adaptive responses or leading to maladaptive responses such as reactance and avoidance (Witte, 1992; Witte & Allen, 2000).

Furthermore, the EPPM model distinguishes between perceived threat severity and susceptibility as a message and perceived severity and susceptibility as individual beliefs (Popova, 2012). The former illustrates the severity (seriousness of harm) and relevance (susceptibility) of a message to a particular target group (e.g., students), whereas the latter refers to the beliefs individuals hold with respect to the threat and health consequences that come with it (Popova, 2012). It is the perceived threat that leads to action, and thus fear-based messages should be convincing enough so that one's propensity to believe they are susceptible to the health threat increases (Maloney et al., 2011)

It also appears that the success or failure of using fear in health communication highly depends on the presence of self-efficacy information, indicating that health messages can be positive, negative, or with high and low self-efficacy content (Bigsby & Albarracín, 2022). Self-efficacy information aims to increase the individual's confidence to manage a threat and is not related to the individual effort required to manage behaviours (Bigsby & Albarracín, 2022). As a result, the EPPM suggests that fear appeals would be more effective if supported by response and self-efficacy information illustrating the benefits of complying with the recommended action so that a behavioural response is more likely to occur (Witte, 1992).

However, a recent meta-analysis on fear appeals did not support this theoretical position, as it did not find evidence that fear appeals with self- and response-efficacy messages differ significantly from fear appeals without such messages (Bigsby & Albarracín, 2022). Their findings suggest that fear appeals can still be effective without providing both types of efficacy information, and the results can be attributed to the fact that many of the studies included in the meta-analysis did not distinguish between response and self-efficacy messages as part of the experimental manipulations (Bigsby & Albarracín, 2022).

In sum, the efficacy of fear appeals depends on self-efficacy, the content of fear appeal messages, and how the information is framed and presented. The theories discussed in this section illustrate why research on health warnings has predominantly focused on cognitive and affective reactions (psychological variables). The following review of the literature will explore the theoretical and psychological mechanisms through which health warnings operate and will then examine research to date on specific design formats and their efficacy.

2.4 Health Warnings Outcomes – Measures of Effectiveness

2.4.1 Negative Emotions and Fear

The effectiveness of a health warning can be determined by quantifying the impact they have on consumer affective reactions (Emery et al., 2014) and one such mechanism of influence is the affective pathway, whereby negative emotions are elicited in response to graphic or disturbing content. In addition to fear, other negative emotions that have

been considered in the literature on product health warnings are worry, anger, sadness, anxiety, and disgust (Kees et al., 2010; Kokole et al., 2021). Tobacco research has consistently shown that effective product health warnings implement images alongside text, and this design combination is very effective in increasing negative emotional reactions in consumers (Droulers, et al., 2017; Drovandi et al., 2019; Francis et al., 2017; Gallopel-Morvan et al., 2011; Hammond, 2012; Lacoste-Badie et al., 2019; Noar et al., 2017; Noar, Francis, et al., 2016; Noar, Hall, et al., 2016). Furthermore, it appears that tobacco health warnings can influence perceived risks beliefs through negative emotions (Byrne et al., 2019; Emery et al., 2014; Francis et al., 2019; Noar et al., 2020), especially content messages about the long-term effects of smoking (Mead et al., 2016).

As research in the field of health warnings on tobacco products has shown the positive effects of image-based health warnings on consumer affective responses, studies of health warnings on alcohol products have followed the same approach and used the well-established evidence from tobacco research as a reference point for developing studies in this domain. Health warnings on alcohol products were found to influence behavioural reactions in consumers through negative emotions, with negative emotions more strongly associated with decreased purchase intentions (Piper et al., 2021), negative product perceptions (Al-hamdani & Smith, 2015), and perceived risks of alcohol use (Wigg & Stafford, 2016), with consumers who experienced stronger negative emotions more likely to drink less alcohol (Pechey et al., 2020; Stafford & Salmon, 2017). Furthermore, a recent study found that alcohol health warnings focusing on minors, addiction, and drink-driving had a greater effect on negative emotions towards the content of warnings than content related to liver cirrhosis (Morgenstern et al., 2021), and more information on the differences between warning types and the

content of warnings in terms of negative emotions is provided later in the Chapter (Section 2.5.6).

2.4.2 Negative Emotions and Reactance

As discussed in Section 2.2.2 on fear appeals, reactance, avoidance, and defensive responses are some outcomes in response to strong fear appeals, with health warnings leading to defensive reactions instead of behavioural compliance. Indeed, health warnings were positively associated with reactance and avoidance in a systematic review of 22 longitudinal studies, which highlighted that tobacco health warnings with shocking images lead to avoidance reactions; however, the studies in that review did not provide evidence that avoidance concurrently leads to negative effects on other behavioural outcomes (Noar et al., 2017). Noar and colleagues synthesised the evidence and further elaborated on these findings by suggesting that individual avoidance of health warnings by the consumers covering them or not thinking about their presence on the cigarette packs may thus indicate warning effectiveness. Although this construct has not yet been identified as a positive factor that most certainly increases the efficacy of health warnings , it appears that avoidance does not negatively affect the persuasive effects of tobacco health warnings (Noar et al., 2017).

Other researchers who examined the same constructs in previous studies on health warnings have also argued that the empirical evidence in this area does not support the presence of unintended consequences resulting from reactance and avoidance (Brewer et al., 2019). For instance, Cho et al. (2016) found that viewers with high and low reactance toward tobacco health warnings were equally likely to think about the health

risks associated with smoking due to the health warnings. Other negative emotions, including reactance, could lead to increased risk perceptions (Emery et al., 2014) and may not necessarily interrupt message elaboration. Hence, health warnings can still be communicated and processed effectively in the presence of reactance, and in some cases, reactance may even reduce smoking intentions (Cho et al., 2016). So, there is some evidence that health warnings could lead to reactance, but reactance could also be a predictor of behavioural compliance.

Although significantly more limited, previous studies of health warnings on alcohol products have found evidence in support of reactance and avoidance, with findings suggesting that negatively framed and cancer-focused alcohol health warnings on products may lead to greater avoidance and reactance compared to positively framed warnings focusing on other health risks in addition to cancer (Maynard, Blackwell, et al., 2018). However, although that study examined reactance and avoidance, the authors did not elaborate on the consequences of reactance and its relationship with drinking behaviour. Similarly, other experimental studies have found that while image-based warnings on alcohol products were associated with reactance, they still effectively altered key precursors to consumer behaviour (Hall et al., 2020; Sillero-Rejon et al., 2018).

However, it is difficult to draw conclusions about whether the effect of fear appeals holds beyond experiments and surveys. Hastings et al. (2004) have already commented on this and provided some evidence that fear appeal campaigns can raise awareness and induce positive reactions, although the positive real-world impact of fear-focused campaigns on actual behaviour is more limited. The lack of evidence in real-world

settings is an issue associated with the external validity of fear appeals research (Hastings et al., 2004), and more limited work has attempted to examine the real-world impact of health warnings on alcohol consumption (Zhao et al., 2020). Although some studies considered whether health warnings decrease alcohol sales and increase awareness and knowledge of alcohol-related harm (Hobin et al., 2020; Weerasinghe et al., 2020; Zhao et al., 2020), they did not elaborate on fear as an explanatory pathway of influence. Instead, these studies suggest that health warning designs need to increase awareness and educate consumers (e.g., alcohol and cancer) as there is some evidence that those who are aware of the health risks of alcohol consumption are ultimately more likely to support alcohol policy, which in turn is expected to decrease alcohol consumption over time (Hobin et al., 2020; Weerasinghe et al., 2020; Zhao et al., 2020).

2.4.3 Cognitive Outcomes

Studies found that prominent health warnings on alcohol products had the ability to induce positive behavioural reactions (Jones et al., 2022), recall (Hobin et al., 2020), knowledge of the health effects of alcohol (Weerasinghe et al., 2020), affective risk perceptions (Ma, 2021), and perceived likelihood of harm (Winstock et al., 2020). Compared to their absence, the presence of well-designed health warnings is also more likely to decrease positive product-based risk perceptions (Al-hamdani & Smith, 2015; Clarke et al., 2020), reduce the social acceptability of the alcohol product (Jones et al., 2022), and increase the support for their implementation (Jones et al., 2021) – although some other researchers did not find significant differences between the presence or absence of a health warning (control) on perceived personal risks (Staub & Siegrist,

2022) and intentions to drink less (Giesbrecht et al., 2022; Pettigrew et al., 2014; Wigg & Stafford, 2016).

Section 2.2 shows that the construct of perceived personal risks is particularly meaningful, as risk perceptions and beliefs are thought to positively impact motivation and intentions to take action (Rogers, 1983; Witte, 1992). Furthermore, perceived risk is an important construct determining drinking behaviour (Staub & Siegrist, 2022) and has been proposed to be related to two dimensions, namely the severity of harm and the perceived likelihood of harm (Noar et al., 2020). The former is defined by the beliefs individuals hold about the severity of the threat, whereas the latter refers to the degree of harm individuals believe is attached to the behaviour referred to in the warning (Noar et al., 2020). Both of these constructs have been researched more extensively in the literature on tobacco health warnings, with experimental and longitudinal studies suggesting image warnings have very limited *direct* effects on the perceived severity and likelihood of harm (Noar et al., 2020; Noar, Francis, et al., 2016; Noar, Hall, et al., 2016).

However, it has been suggested that health warnings should feature risks to which smokers feel susceptible (Maynard, Gove et al., 2018) and that higher susceptibility increases negative emotions (Trasher et al., 2016). Furthermore, individuals who believe they are susceptible to particular diseases are those most likely to believe health warnings compared to non-susceptible individuals (Maynard, Gove, et al., 2018). These findings can be explained by the health belief model (Janz & Becker, 1984), where someone who is more susceptible to a particular disease may become more motivated to change behaviour if a health warning delivers a personally relevant message. Individual

behaviour is more likely to change if the disease is serious; thus, the recipient can reject or accept the health message based on their perceived likelihood of harm (Rosenstock, 1963).

To date, little evidence in support of associations between perceived likelihood of harm and risk beliefs has been found in studies of alcohol health warnings. For example, a systematic review by Scholes-Balog et al. (2012) on text-based, driving- and pregnancy-related health warnings did not suggest the warnings increased perceived risks of alcohol use. However, two other studies found that health warnings on alcohol products increased perceived risks of alcohol use via negative emotions (Wigg & Stafford, 2016) and that cancer health warnings can increase perceived risks of getting cancer as a result of alcohol consumption (Clarke et al., 2020).

These findings suggest that in addition to affective reactions discussed in the previous section, health warnings might influence consumer behaviour by enhancing cognitive elaboration of the health-related risks associated with alcohol, including awareness, product perceptions and perceived personal risks of alcohol use. It also appears that affective reactions, particularly negative emotions, could enhance cognitive responses in consumers, such as perceived risks of alcohol use.

2.4.4 Self-Efficacy

As discussed earlier in this chapter, self-efficacy is a central construct in fear appeal theories and refers to the extent individuals are able to exercise control over their health and manage a danger (Witte, 1992). In a review of 60 years of evidence on fear appeals,

Ruiter et al. (2014) argue that studies should focus on self-efficacy as a motivational construct in behavioural change, especially in the context of health promotion, and that it is self-efficacy that increases risk perceptions rather than fear alone. Ruiter et al.'s findings suggest that health communication should boost individual self-efficacy and that self-efficacy increases the acceptance of health-related messages.

It has also been argued that self-efficacy moderates the relationship between fear and behavioural change (Snipes et al., 1999). For example, a study by Witte and Allen (2000) found that high self-efficacy had an effect on the performance of fear appeals and the combination of high threat (fear) and high self-efficacy was most effective in terms of influencing behaviours. However, low self-efficacy may also lead to change in behaviour, particularly when fear appeal communication is supported by response efficacy messages (Witte & Allen, 2000). As mentioned earlier, an example of response efficacy is a message offering solutions in the form of a quit plan (with a phone number) or a website link that could support behavioural change (Gallopel-Morvan et al., 2011).

Studies examining self-efficacy as a construct in the literature on health warnings tend to be more limited, although there has been some evidence that health warnings can influence behaviour under high self-efficacy (compared to low self-efficacy) and that health warnings are more likely to be accepted based on high self-efficacy (compared to low self-efficacy), which is in line with the fear appeals literature. For example, a longitudinal study conducted in Australia and Canada found that consumers' responses towards tobacco health were moderated by self-efficacy, and a high self-efficacy score was associated with increased intentions to quit smoking (Thrasher, Swayampakala,

Borland, et al., 2016). Other studies showed that individuals who were more responsive to health warnings were those more likely to report higher self-efficacy (Maynard, Blackwell, et al., 2018), and individuals high in self-efficacy were less likely to avoid health warnings on alcohol products (Sillero-Rejon et al., 2018). Furthermore, it was found that image-based health warnings on alcohol products influenced perceived self-efficacy to drink less via affective risk perceptions, particularly the "feeling of worry of getting cancer" (Ma, 2021).

Despite being central to fear appeal theories, the existing evidence suggests mixed findings, and it is not clear whether individuals with low self-efficacy are less likely to change behaviour than individuals with high self-efficacy; thus, further research is needed to elucidate this issue (Tannenbaum et al., 2015), as there has been some evidence that individuals with low self-efficacy were responsive to health warnings and did not react defensively (Romer et al., 2018).

2.4.5 Intentions and Behaviour

While some researchers have argued that health warnings can effectively change behaviour over time (Argo & Main, 2004), behavioural change is difficult to measure, and intentions to behave represent a proxy for this construct (Noar, Hall, et al., 2016). Longitudinal studies have shown that health warnings on tobacco packaging can reduce tobacco consumption and increase individual intentions to quit smoking (Anshari et al., 2018; Cho et al., 2018; Noar et al., 2017; Thrasher, Swayampakala, Cummings, et al., 2016), especially in the case of large health warnings with severe images.

To illustrate this point, early work in the alcohol arena focused on the US government health warnings on alcohol product labels, and many of the findings demonstrate that content related to drink-drive and pregnancy did not modify individuals' reactions and had no significant impact on alcohol consumption and drinking behaviour (MacKinnon et al., 2000, 2001). The US health warnings have been systematically evaluated over time (Andrews, 1995, Stockley, 2001; Stockwell, 2006), and it appears that well-designed health warnings with content focusing on specific alcohol-related health risks are more effective.

For example, more recent studies that varied the types of health warnings using experimental methodologies found positive effects on cognitive and affective reactions, drinking intentions, and self-reported alcohol consumption (Clarke et al., 2020; Pechey et al., 2020; Pettigrew et al., 2016; Sillero-Rejon et al., 2018; Stafford & Salmon, 2017; Wigg & Stafford, 2016; Winstock et al., 2020), particularly when more prominent and larger warnings were tested—with specific content, contrasting colours, and with severe images. It is also notable that this body of work examined cancer warnings on product labels as part of the experimental investigations and found that they were able to modify behavioural responses in consumers. Additionally, a Canadian time-series study examined the effects of alcohol health warnings for products and observed that new and prominent alcohol product warning designs focusing on cancer decreased per capita alcohol consumption (Zhao et al., 2020). Other studies examining various mock alcohol warning designs in Australia found that exposure to cancer warnings led to changes in self-reported drinking intentions among drinkers (Pettigrew et al., 2016) and that individuals were likely to agree that cancer warnings could change their drinking or behaviour of friends (Miller et al., 2016). Furthermore, another study found that cancer

warnings referring to specific types of cancer were also found to influence drinking behaviour more effectively (Winstock et al., 2020).

The aforementioned evidence indicates that the use of fear appeals in the form of cancer health warnings can induce positive reactions in consumers, and the following sections will address some possible reasons for that.

2.5 Contextual Factors Impacting Health Warning Effectiveness

According to Young (1991), the efficacy of health warnings depends on their design format, layout, type, position, and colour, and these features are more likely to draw attention to the warning message and lead to greater elaboration and judgment (Argo & Main, 2004; Purmehdi et al., 2017). As a result, considerable attention has been given to the design and format of health warnings, especially in the context of products.

2.5.1 Type of Health Warnings

Health warnings can vary in terms of written information, images, icons or a combination of some of these features. It has been argued that symbols, pictograms, and images strengthen the overall written argument (Laugher et al., 1993) and can provide visual information that helps individuals and children who cannot read understand the warning message (Young, 1991). Many studies on tobacco health warnings have focused on the differences between text and image-based health warnings, with more recent work specifically showing that the use of shocking images increases attention and awareness (Drovandi et al., 2019; Francis et al., 2019; Hammond, 2011), negative

emotions (Francis et al., 2019; Noar et al., 2020; Noar, Francis, et al., 2016; Noar, Hall, et al., 2016; Pang et al., 2021), and knowledge of the health effects of tobacco consumption (Noar, Francis, et al., 2016), negatively influence attitudes toward smoking (Noar, Hall, et al., 2016), and are perceived to be more believable (Maynard, Gove, et al., 2018). To compare the intensity of fear, the characteristics of warning images have also been evaluated, with shocking images (reflecting high threat) more likely to increase fear and negative emotions towards smoking (Droulers et al., 2017; Lacoste-Badie et al., 2019), and that text and images should be synchronised to achieve maximum impact (Lochbuehler et al., 2017).

The findings related to alcohol product health warnings are more limited, with some studies highlighting the benefits of using new pictogram formats to promote pregnancy-focused health messages on alcohol products (Millot & Gallopel-Morvan, 2020) and that image-and-text health warnings are more effective than single-text health warnings (Morgenstern et al., 2021) and are also more likely to increase negative emotions than health warnings only featuring icons (Annunziata et al., 2017). Other studies found that compared to single-text health warnings or the absence of any (control), image-based warnings can be more effective in modifying behaviour compared to the control group, namely with regards to slowing consumption (Stafford & Salmon, 2017) and reducing drinking intentions (Pechey et al., 2020; Sillero-Rejon et al., 2018; Wigg & Stafford, 2016). Furthermore, Clarke, Pechey et al. (2021) found that image-and-text warnings are more effective than single-text warnings, although image-based warnings, with and without text on alcohol packaging, are more likely to induce reactance than single-text warnings. In addition, images alone (without text) are more effective designs than single-text warnings in terms of negative emotions, but again the acceptability of this

warning label was significantly lower than that of single-text warnings (Clarke, Blackwell et al., 2021).

However, image-based health warnings are not consistently superior to single-text health warnings, with some studies suggesting no significant differences between single-text and image-and-text health warnings on risk perceptions of alcohol use (Wigg & Stafford, 2016) and negative emotions (Sillero-Rejon et al., 2018). Furthermore, a meta-analysis of nine studies found that while the presence of health warnings impacted product selection, the warning designs with respect to image and text-based warnings had no impact (Clarke et al., 2020). Similarly, a cross-sectional survey with an experiment tested health warnings with and without shocking images on alcohol packaging and did not find evidence that image-based warnings were superior to single-text warnings (Jones et al., 2022). It also appears that image-based warnings on alcohol products are also less acceptable and believable (Hall et al., 2020; Pechey et al., 2020), and the lower believability scores are associated with reactance and avoidance behaviour (Blackwell et al., 2018).

The aforementioned studies show that although health warnings with images are effective in increasing attention and negative emotions, their superiority over text warnings is not yet well-established as with tobacco health warnings. In this regard, Al-hamdani and Smith (2017) argue that alcohol consumption is socially acceptable, and it is not surprising that the participants in some of the studies were likely to oppose health warnings with shocking images, although this does not indicate that they are less effective in modifying behaviour (Hall et al., 2020).

2.5.2 Responsibility Messaging

The definition of a health warning implies that a visual or written health information (or a combination of both) appears on packaging (Hassan & Shiu, 2018), and "drink-responsibly" messages do not seem to fit these criteria, as they are not considered health warnings per se and do not provide health information on alcohol-related harm.

Kersbergen and Field (2017a) conducted a two-stage study (including a cross-sectional survey and an experiment) in the United Kingdom and found that the impact of drink-responsibly messages on drinking intentions was not significant. Similarly, as part of their experiment with a convenience sample of 162 drinkers in the United Kingdom, Clarke and Rose (2020) found that labelled glasses with "drink responsibly" warning messages and standard drinking guidelines did not change drinking intentions. Critchlow et al. (2020) studied the awareness and recall of these messages on alcohol products in the United Kingdom, and their results showed that voluntary messages on alcohol product labels were ineffective in terms of awareness and recall. In addition, an Australian study found that young adults were not motivated to change their behaviour based on the industry-funded responsible drinking messages (Coomber et al., 2018), and the same conclusion was drawn in Italy with a study examining their effectiveness among Italian youths (Annunziata et al., 2017).

Researchers have highlighted that countries should implement more definitive and specific health warnings linking alcohol with cancer or mental health issues (Blackwell et al., 2018), and although drink responsibly messages are not a form of health warning type and do not fit this definition, these studies illustrate the critical importance of

warning format and design characteristics and offer researchers a unique opportunity to examine well-designed health warnings that deliver health information.

2.5.3 Size of Health Warnings

The general consensus in the tobacco health warnings literature is that larger warnings are more noticeable and more easily recalled, and the warnings must be made larger to be considered effective (Droulers et al., 2017; Francis et al., 2019; Hammond, 2011; Noar, Hall, et al., 2016). Despite this, the health warnings on alcohol products and in alcohol ads are relatively small, to the point that they are regarded as almost invisible (Al-hamdani, 2014; Martin-Moreno et al., 2013). However, whether or not larger health warnings are more effective than smaller warnings on alcohol products is yet to be established, as experimental studies examining this design feature are considerably lacking (Giesbrecht et al., 2022). It appears that only two more recent studies compared the size of health warnings on alcohol packaging with Al-hamdani and Smith (2017) who examined health warnings occupying 50% versus 75% versus 90% of the bottle label for alcohol products and found that larger warnings decreased viewers positive perceptions of the alcohol product. On the other hand, a more recent study that manipulated the size of health warnings on vodka bottles did not find significant differences between larger and smaller text warnings in terms of behavioural reactions (Jones et al., 2022). Although the authors did not specify the exact text size of the health warnings tested on the product labels, it appears that the larger text warnings were double the size on the alcohol product than the smaller-text health warnings in their survey experiment.

2.5.4 Colour of Health Warnings

Colour is another important feature that can draw attention to health warnings, convey meaning and communicate different levels of danger (Young, 1991). Experimental research has demonstrated that the use of colour can clarify the meaning of icon warnings and improve consumers' understanding of these icons (Laughery & Wogalter, 2006; McDougald & Wogalter, 2014). Although the meanings of symbols and colours differ across cultures, red is most frequently used in health warning designs to warn and communicate danger (Smith-Jackson & Wogalter, 2000), and the colour red has been found to increase the noticeability of alcohol health warnings (Pham et al., 2017). The reasoning behind these findings is that red is thought to communicate a more significant hazard, compared to yellow, grey, and white (Smith-Jackson & Wogalter, 2000).

Other colours including yellow, orange, and black have also been recommended for the design of effective health warnings (Smith-Jackson & Wogalter, 2000; Wogalter et al., 2002). However, alcohol warnings, both text and icons, often blend in with the product colours and thus do not draw sufficient attention to the health risks associated with alcohol consumption (Eurocare, 2014). The use of contrasting colours is particularly relevant if health warnings compete with other visual elements, as in advertising (King et al., 2020). Finally, the role of colour in the effects of health warnings cannot be assessed in isolation and should be examined in conjunction with other design features in order to increase the likelihood that health warnings will be noticed and understood (Wogalter et al., 2002).

2.5.5 Location of Health Warnings

Another characteristic that may be manipulated to achieve maximum impact is the choice of placement of health warnings on products. Studies on tobacco packages indicate that the effects of health warnings may differ depending on whether they are placed on the front or back of the pack (Moodie et al., 2015) and on plain or branded cigarette packs (Gallopel-Morvan, 2015; Gallopel-Morvan et al., 2018; Moodie et al., 2011), with findings suggesting that health warnings displayed on the front of plain cigarette packs increase the visibility of health warnings.

To further support tobacco health warnings policies, another study has focused on placement innovations such as printing warnings on every cigarette, which were perceived to be more frightening and represent an effective way to communicate the health risks of tobacco consumption (Moodie et al., 2019). A similar approach was tested on alcohol product warnings by placing drinking guidelines on glasses (Clarke & Rose, 2020), although the information labelled on the glass did not contain health-related messages and the findings were not as promising as those of the studies related to cigarettes.

Currently, existing alcohol warnings are usually placed on the back of alcohol products; however, Eurocare (2012) recommends that the correct placement for alcohol product warnings is the front of the bottle label area, away from other product information. Studies of health warnings on alcohol products tested this recommendation and found significant effects on key precursors to consumer behaviour such as recall, negative emotions, elaboration, judgement and drinking intentions (Clarke et al., 2020; Pechey et

al., 2020; Stafford & Salmon, 2017; Wigg & Stafford, 2016). Furthermore, the findings of three meta-analyses of product health warning studies suggested that consumers' reactions to health warnings are moderated by the location of the warning (Argo & Main, 2004; Hancock et al., 2020; Purmehdi et al., 2017), although there seems to be limited recent work on the effects of varying the location of health warnings on the product label.

2.5.6 Content and Message Framing of Health Warnings

Content refers to the wording of the warnings and the wording instructions portraying the risks as an outcome of a particular behaviour (Young, 1991). Message framing in the context of health warnings refers to whether the messaging highlights the benefits of engaging in a particular behaviour (gain-frame) or if not following the guidelines leads to certain associated consequences (loss-frames; Strahan et al., 2002). Message framing characteristics that have been considered in the literature on alcohol product warnings include positively framed warnings referring to "if you stop X behaviour, it will reduce Y risk" and negatively framed warnings such as "X behaviour kills" (Strahan et al., 2002).

Pettigrew et al. (2014) found that positively framed warning statements such as "reduce your drinking to reduce your risk of cancer" were perceived as more believable and convincing than negatively worded statements such as "alcohol increases your risk of cancer." Furthermore, there is evidence that "increases the risk of" was more effective wording than "can cause" (Pettigrew et al., 2014), and it appears that promoting positive attitudes in terms of quitting a particular behaviour should also be considered in the

design of health warnings—in addition to the negative consequences of a particular behaviour (Strahan et al., 2002). For example, it was found that negatively framed health warnings can induce positive reactions in smokers with high self-efficacy, whereas positively framed health warnings were effective for smokers with low self-efficacy (Mays et al., 2015). The authors concluded that combining both message framings could be particularly beneficial in enhancing motivation to change behaviour.

Another area of interest is language. For example, the pregnancy and drink-drive health warnings on alcohol product labels in the United States were compared to more specific warnings (designed by the researchers) that included the words "cancer," "toxic," and "poison." The findings of this series of experiments suggested that viewers were more likely to avoid alcohol consumption after exposure to these specific warnings, and as a result the specific warnings outperformed the more general warnings related to pregnant women and drivers (MacKinnon, 1993; MacKinnon et al., 1994). Although relatively few older studies examined the wording and content of health warnings, there appears to have been an increase in research examining consumers' reactions to more specific and generic warnings. For example, some researchers compared generic and specific wording where *general* refers to messages with a lack of information on specific alcohol-related diseases and may take the form of "alcohol can cause cancer," whereas specific messages would likely specify a particular type of fatal cancer and may be expressed as "alcohol can cause bowel, breast or liver cancer" (Pettigrew et al., 2014). Two Australian studies found that drinkers exposed to specific wording such as "alcohol increases your risk of bowel or breast cancer" were rated as more convincing and more believable than "alcohol increases your risk of cancer" (Miller et al., 2016; Pettigrew et al., 2016); however these studies examined stand-alone statements that

were not displayed on alcohol products. Other researchers reported similar findings where specific warning statements were more effective on a number of behavioural outcomes, including awareness, cognitive reactions, believability, knowledge, and drinking intentions (Hobin et al., 2020; Jongenelis et al., 2018; Laughery et al., 1993; Weerasinghe et al., 2020).

These findings generally reflect some aspects of the fear appeals theory and highlight the importance of fear intensity as adding or removing content can affect cognitive and affective responses differently (O'Connor, 2019). According to a meta-analysis study, self-efficacy and response-efficacy moderate the effectiveness of fear appeals (Floyd et al., 2000), and the debate appears to be whether negatively worded (a fear message), positively worded (a response-efficacy message), or a combination of both increases the effectiveness of health warnings (Gallopel-Morvan et al., 2011). Highlighting that just negative or positive wording works better clearly demonstrates one side of the argument associated with fear appeals, and there is a need for more clarity on what type of content works best in the context of alcohol so that the most effective content combination can be determined.

Some studies have shown other wording characteristics that affect consumer cognitive reactions. For example, Ma (2021) found that adults viewing narrative warnings with images of people and the text "alcohol consumption will give me liver cancer" reported higher affective risk perceptions than those viewing non-narrative warnings with images of diseased organs and the text "alcohol consumption causes liver cancer." It is believed that narrative warnings induce greater feelings than non-narrative warnings, thus making them more effective in promoting health behaviour (Ma, 2021). Finally, a study

by Jongenelis et al. (2018) investigated five alcohol warning statements with respect to liver and heart diseases, diabetes, cancer, and mental health, with findings demonstrating that all statements impacted participants' alcohol-related beliefs, but the liver statement was significantly less likely to impact the risk beliefs of higher-risk drinkers and their drinking intentions than statements related to cancer, mental health and diabetes. Although the authors did not attempt to explain their findings through a theoretical lens, according to the fear appeals literature, it may be that higher-risk drinkers have lower self-efficacy, or liver and heart diseases as a consequence of alcohol consumption were not considered fearful enough to modify their intentions to drink.

2.6 Conclusion

This chapter provided a theoretical background of the various outcomes used to examine the effectiveness of health warnings on product labels, and given that health warnings deal with fear issues, the chapter examined whether fear appeals are an effective communication tool in modifying attitudes and behaviours. Four theories demonstrating the conditions under which fear appeals can be effective were reviewed, including the effects of other negative emotions such as anger and reactance. After reviewing the literature on health warnings in general and, more specifically, studies of health warnings on alcohol products, it is evident that consumers' cognitive and affective reactions to health warnings may differ. However, unlike that of tobacco, the potential of alcohol health warnings to discourage alcohol consumption is yet to be fully investigated.

Finally, this chapter also addressed the concept of warning designs and which design features increase the effectiveness of health warnings, including the type, size, location, and content. From the reviewed literature, it appears that prominent and specific health warnings are more impactful, and the evaluation of cancer warnings is of particular significance. However, whether these findings are applicable to alcohol advertising is unknown, and the following chapter delves into alcohol advertising as another important context warranting further research.

CHAPTER 3: HEALTH WARNINGS IN ADVERTISING

Alcohol marketing, alcohol ad content, advertising health warnings

3.1 Introduction

Although researchers are increasingly turning their attention to health warnings on alcohol products, limited research has attempted to explore how consumers react to health warnings embedded in advertising. This is thus a unique context in which to explore the influence of health warnings and their ability to modify individuals' behaviour. While Chapter 2 reviewed consumers' reactions to and engagement with health warnings on product labels, the current chapter argues that advertising is an important point of observation when studying the effectiveness of health warnings. Hence, this chapter brings together research on alcohol advertising and the literature from advertising health warnings research. It begins with a brief overview of the influence of alcohol marketing on drinking behaviour both internationally and in Ireland. The chapter then turns to the advertising health warnings literature with a particular focus on the role of alcohol ad content in the process of persuasion, and it is in these sections that it becomes aparrent that the content of advertising is also seen as a key factor in the efficacy of health warnings. To better understand how health warnings in ads work, the chapter concludes with an overview of the elaboration likelihood model [ELM], which helps explain the implications of having alcohol ads with social imagery—as a contextual factor promoting alcohol consumption—with health warnings that provide a negative health-related information about alcohol.

3.2 Update of International Evidence on Alcohol Marketing and Drinking Behaviour

Research into the influence of alcohol marketing on drinking behaviour can be broadly classified into those that econometrically quantify behaviours on a population-based level and those that take a consumer perspective. Econometric studies investigate possible linkages between exposure to alcohol advertising expenditure and the levels of alcohol consumption based on sales, whereas consumer studies take into account the influence of marketing communications—and not just advertising—on attitudes, drinking intentions, and behaviours (Anderson & Baumberg 2006; Anderson et al., 2009; Gordon et al., 2011).

3.2.1 Econometric studies

Econometric studies have been conducted to examine the relationship between alcohol advertising expenditure and total alcohol sales, with findings suggesting limited associations between exposure to alcohol advertising and aggregate alcohol consumption (Bourgeois & Barnes, 1979; Calfee & Scheraga, 1994; Duffy, 1991; McGuinness, 1980; Nelson 1999, Franke, & Wilcox, 1987). This approach measures the effect of advertising based on time-series aggregate expenditures, cross-sectional measures, and advertising bans (Saffer & Dave, 2003), and alcohol companies often cite this econometric data to maintain that alcohol advertising does not work to increase sales. However, econometric data do not provide an adequate evaluation of the real influence of alcohol advertising on consumption, and there are a variety of dynamic issues in marketing that econometric studies do not capture, as they are based on

estimates (rather than actual sales), do not account for the marginal effect of advertising over time, and consider the effectiveness of alcohol advertising on sales in isolation (Kenny & Hastings, 2010). Similarly, Anderson and colleagues (Blumberg, 2006; Gordon et al., 2011; Hastings et al., 2005) highlighted that econometric studies do not capture possible confounding effects of other variables impacting alcohol consumption and do not provide information in terms of exposure to alcohol marketing across specific segments of the population (e.g., adolescents and young people).

3.2.2 Consumer Studies

These type of studies are an alternative approach that has been suggested to be likely to address some of the methodological limitations of econometric research (Anderson et al., 2009; Farrell & Gordon, 2012; Kenny & Hastings, 2010; Sargent et al., 2020) and have employed longitudinal, cross-sectional, and experimental methodologies to investigate the impact of alcohol marketing. This body of research consistently shows that exposure to alcohol marketing is associated with negative health consequences, earlier alcohol initiation, increased alcohol consumption and greater drinking intentions in the future (Anderson et al., 2009; Finan et al., 2020; Gordon, 2011; Hastings, 2011; Hastings et al., 2005; Jernigan et al., 2017; Sargent et al., 2020; Sargent & Babor, 2020; Smith & Foxcroft, 2009).

In recent years, researchers have increasingly focused on the impact of digital alcohol marketing as it can harness the power of peer networks in creative ways. For example, a recent systematic review of 25 studies illustrates that digital advertising, with its combined use of consumer engagement and peer networks, is even more powerful than

traditional marketing, and a wide range of digital alcohol marketing activities, including social media channels and websites, influence young people's attitudes and intentions to drink (Noel et al., 2020). The impact of exposure to alcohol marketing in various channels (e.g., new media) on consumers' drinking behaviour and future drinking intentions has also been documented, with findings suggesting a significant positive relationship between exposure and consumption amongst Scottish adolescents (Gordon et al., 2011).

Another cross-sectional survey conducted in New Zealand that examined exposure to different marketing channels, engagement, and future drinking intentions arrived at similar conclusions (Lin et al., 2012). More recently, the findings of a recent cross-sectional study that assessed individuals' awareness of multiple forms of alcohol marketing suggested that, compared to individuals with low marketing awareness, those reporting greater marketing awareness were also high-risk drinkers, whereas never-drinkers reported greater susceptibility to drink in the future (Critchlow et al., 2019).

3.3 Alcohol Advertising in Ireland

As discussed in Chapter 1, the Advertising Standards Authority for Ireland [ASAI] aims to regulate and monitor non-compliant ads in Ireland. According to Section 9 of the Code of Standards for Advertising and Marketing Communications (7th edition), the Irish drinks industry agrees that alcohol marketing should not be targeted at children and should not encourage excessive alcohol consumption (Advertising Standards Authority for Ireland [ASAI], 2016). The ASAI self-regulation and all ASAI members

agreed to adhere to a voluntary code that guides the alcohol industry to comply with the following criteria:

- alcohol ads shall not be targeted at children and not feature content appealing to children
- alcohol ads shall not link consumption to personal, sexual, and social success.
- alcohol ads shall not portray that alcohol contributes to increased physical performance
- marketing communications shall not contribute to excessive drinking (Advertising Standards Authority for Ireland [ASAI], 2016)

The Code closely reflects the guidelines set out in the self-regulatory practice by international industry organisations in Europe, and the Committee Board comprises industry practitioners. However, there are several reasons to be concerned about the ASAI self-regulatory codes and children's exposure to alcohol marketing in particular. For example, research with Irish adolescents suggests that exposure to alcohol advertising increases adolescents' perceptions of success and likelihood to consume alcohol and that alcohol advertising appears to influence drinking behaviours by normalising consumption (Dring & Hope, 2001; Fox et al., 2015; Hope, 2009). Dring and Hope (2001) examined individual perceptions and code compliance of alcohol ads promoting well-known alcohol brands, with findings suggesting that the content of alcohol ads induced more positive beliefs associated with fun and social success and that self-regulatory advertising codes are an inadequate control measure in protecting young people from exposure to alcohol advertisements. Another study examined exposure to alcohol marketing among 686 adolescents across 16 schools in Ireland, with

findings suggesting that Irish children were exposed to alcohol marketing on traditional and digital media and that higher exposure was associated with increased drinking behaviour (Fox et al., 2015). Similar findings were reported elsewhere, particularly that young people in Ireland were aware of and exposed to alcohol marketing across all elements of the marketing mix–- product, price, place, and promotion (Hope, 2009). Such evidence demonstrates that the current advertising for alcoholic beverages needs to be regulated, and in line with Section 13 of the PHAA, social imagery associated with social success and the presence of humans will be prohibited (Oireachtas, 2018).

In the context of the new marketing restrictions in Ireland, a recent cross-sectional study with adults examined changes in awareness of alcohol marketing one year after the restrictions with respect to children's branded clothing, public transport, outdoor, and cinema advertising were implemented (Critchlow & Moodie, 2021). Based on two waves of data collection, the study found that the new restrictions on alcohol marketing decreased alcohol marketing awareness, although this work also suggests that estimates should be treated with caution due to the Covid-19 restrictions during this time (Critchlow & Moodie, 2021). Evidence from Ireland also shows that heavy advertising of alcohol through sports plays a significant role in promoting alcohol consumption and that children are aware of alcohol advertising during sporting events in Ireland (Houghton et al., 2014). While Section 15 of the PHAA restricts advertising at sporting events aimed at children, the legislation does not account for the promotion of bars at sport events which connect bars with alcohol consumption (Houghton & McInerney, 2019). So perhaps even more dramatic regulatory changes will likely be necessary.

3.4 The Influence of Alcohol Ad Content

Although the quantity of exposure to alcohol marketing has been studied in detail, much research still needs to be conducted on the roles and persuasive influence of alcohol ad content (Bosque-Prous et al., 2014; Henehan et al., 2020; Jernigan et al., 2017; Jones & Gordon, 2013). Very few studies have examined the possible effects of the content of alcohol ads in conjunction with the effects of health warnings (Diouf & Gallopel-Morvan, 2020; Dossou et al., 2017), especially typical alcohol ad themes such as the presence of humans embedded in ads (Morgenstern et al., 2017). It remains largely unexplored whether the content of alcohol ads moderates the effectiveness of health warnings.

As with all advertising, the content of alcohol ads is designed to be appealing in nature, and the more consumers are aware of and receptive to alcohol advertising, the more likely they are to increase their consumption and become heavy drinkers (McClure et al., 2013). Researchers have found that attractive content increases receptivity to alcohol ads (Henriksen et al., 2008) and mediates the link between exposure to alcohol advertising and cognitive reactions (Fleming et al., 2004). A recent cross-sectional study investigating the reactions of a sample of 2582 UK teenagers to alcohol ads found that alcohol ads of three well-known brands induced positive reactions in viewers (aged between 11-17 years old) and increased susceptibility to consumption in the future, particularly for never drinkers (Boniface et al., 2021).

The message interpretation process model (Austin & Knaus, 2000), heuristic advertising receptivity model (McClure et al., 2013), advertising effectiveness model (Vakratsas &

Ambler, 1999), and elaboration likelihood model (Petty & Cacioppo, 1986) all highlight the importance of the characteristics of the message (e.g., ad content) as well as psychological constructs, including the cognitive, affective, and moderating factors that have been found to influence levels of alcohol consumption and the effectiveness of advertisements. Although more focused on teenagers, the message interpretation framework positions the content of alcohol ads as a key construct that is likely to impact teenager's behavioural responses (Austin et al., 2006), and researchers have used this model to classify studies that assessed the impact of alcohol ad content on drinking-related outcomes (for a review, see Henehan et al., 2020).

3.4.1 Social Cues and Product Cues in Alcohol Ads

Alcohol ads typically feature social cues that feature the presence of people drinking alcohol, as alcohol consumption more commonly occurs in social settings, and viewers are more likely to pay attention to alcohol ads that are relevant to them (Alhabash et al., 2021). A recent study proposed a neurobiological framework that highlights the important role of alcohol ad content, particularly the presence of socioenvironmental cues that induce never-drinkers, including teenagers, to develop positive perceptions about alcohol consumption at an early stage of their lives (Courtney et al., 2020). The use of appealing alcohol cues promotes drinking, with studies suggesting that emotional content was more likely to increase alcohol consumption compared to rational ads featuring product-related information (Covell et al., 1994), and party-related content was more likely to lead to greater drinking intentions than ad content without party-related themes (Morgenstern et al., 2017). Furthermore, a systematic review that sought to assess the cognitive reactions of youths to alcohol ad content messages based on 22

studies published between 1988 and 2016 highlighted that visually appealing alcohol imagery more persuasively increases intentions to drink compared to product-oriented ads that only focus on product benefits (Henehan et al., 2020). Other studies found that alcohol ads based on sport- or party-related themes were associated with more positive individual reactions compared to neutral ads featuring only alcohol bottles and brand logos (Gallopel-Morvan et al., 2022), and beer ads featuring younger people aged under 25, were more likely to increase self-reported intentions to drink among adolescents than ads featuring adults older than 25 (Alhabash et al., 2021).

One of the key reasons underlying the content effects observed across studies is likely that viewers are typically primed to positive perceptions (Alhabash et al., 2016) and positive ad-related cues are central to the process of decision-making (Alhabash et al., 2021)—particularly cues embedded in ads that are "social" and promote social drinking (Courtney et al., 2020; Szmigin et al., 2011), through content that features behaviour-related activities in social contexts (Huo et al., 2018). Using humans in ads is defined as a "social actor" that satisfies the social needs of the viewers (Huo et al., 2018), and alcohol ads often emphasise imagery that speaks to the experience one could have of alcohol consumption with the ad characters reflecting the benefits of drinking that motivate consumption, such as love, fun, success, and friendship (Hastings et al., 2005; Zwarun & Farrar, 2005). Though social cues go beyond merely embedding humans in ads, they are still defined as peripheral cues that can affect the process of communication via social influence (Petty et al., 1983; Wallace-Williams et al., 2022). Alcohol ads using social cues trigger social support for drinking alcohol and reinforce social norms via featuring images that promote increased consumption (Aitken et al., 1988; Alhabash et al., 2021; Andrews & Netemeyer, 1996).

One of the objectives of this thesis is to investigate whether the presence of social cues (people drinking alcohol in a social setting) will decrease the effectiveness of health warnings and thus distract viewers from the health warnings. The following sections provide an overview of the research to date on advertising health warnings that take into consideration the possible effects of the content of the ads with respect to the effectiveness of health warnings.

3.5 Empirical Evidence for Impacts of Advertising Health Warnings

The unique characteristic of health warnings featured in advertisements is their ability to disseminate information to a broader audience of consumers, including those who consume particular products and those who do not (Laughery & Wogalter, 2006). Health warnings in advertisements are also subject to other contextual factors impacting behaviour, such as the content of ads, and research should assess a wider range of outcomes to include both the warning designs and the content of alcohol ads. Studies on health warnings in ads were based on a variety of domains (e.g., food, non-alcoholic drinks, alcohol, and cigarettes) and provided mixed evidence overall. For example, some researchers argue that prominent warnings can compete with the content of the ads (Davis & Burton, 2016; MacKinnon & Lapin, 1988; Niederdeppe et al., 2019; Stark et al., 2008; Strasser et al., 2012), while others suggest the opposite where ad-related cues are more likely to undermine the effects of health warnings (Dossou et al., 2017; Effertz et al., 2013; Farace et al., 2020; King et al., 2020; Mays et al., 2016). The following two sections present the content of ads and the design of health warnings as two important factors that need to be considered in research on advertising health warnings, independent of the domain.

3.5.1 Health Warning Designs in the Context of Advertising

Similarly to studies on product health warnings, there have been studies that explicitly focused on the warning designs in advertisements without investigating the effects of ad content characteristics. According to some researchers, it is the design of warnings that makes them stand out within the advertising environment (Barlow & Wogalter, 1991; Krugman et al., 1994; Stark et al., 2008).

Warning Type. A mixed-factorial experimental study on ads promoting tobacco-related products found that an image-based warning decreased the believability and appeal of the ad compared to a standard text warning, with viewers exposed to the image-based warning less likely to report an interest in trying or purchasing the advertised smokeless tobacco products that are generally perceived as less harmful than cigarettes (Stark et al., 2008). It is of note that while all tobacco advertising is banned under the World Health Organization Convention of Tobacco Control Framework (FCTC), the law does not apply to alternative ("less-harmful") tobacco products and e-cigarettes in the United States (Stark et al., 2008). This is one reason why research to date has examined health warnings in advertisements promoting electronic cigarettes or other alternatives to tobacco consumption.

Davis and Burton (2016) replicated a study on product health warnings with the idea of testing whether image-based warnings will lead to increased negative emotions in the context of advertising. Their findings suggest that severe image-based health warnings increased attention to the ad and negative perceptions of tobacco products via negative emotions, indicating that fear was an important pathway of influence. In addition, an

eye-tracking Canadian study found that image-based warnings in cigarette Marlboro ads accompanied by the text "Cigarettes cause lung cancer, every cigarette you smoke increases your chance of getting lung cancer" scored 80% higher in terms of health warning recall compared to the standard government text warning "Quitting smoking now greatly reduces serious risks to your health" (Strasser et al., 2012). However, Strasser et al.'s findings should be interpreted with caution due to the inconsistencies between their experimental study conditions. For example, while the authors intentionally compared the legislated warning against a mock warning, the manipulated image-and-text warning was featured on a black background with white letters, whereas the text warning was displayed on a white background with black letters. Furthermore, the text-only warning was smaller than the image warning, which may explain the observation of significantly higher recall of the image warning.

While they did not focus on shocking imagery, Mays et al. (2016) aimed to examine text warnings in e-cigarette ads among viewers exposed to an ad (without warnings), a warning (without ads), or ads displaying three popular e-cigarette brands with warnings. Although no significant differences were found between the experimental groups in terms of smoking intentions, the participants who viewed the health warning alone reported higher perceived harm than those who viewed the ads with and without health warnings (Mays et al., 2016). The study observed weak effects for text warnings embedded in e-cigarette ads; however, the first ad featured a government warning, the second included a mock warning focusing on health harms (designed by the researchers), and the third contained an industry-sponsored warning. Therefore, the content of the text warnings differed across the ads and brands, limiting the internal validity of this factorial experiment.

Colour. Health warnings displayed in contrasting colours are widely regarded as more noticeable and effective in communicating health risks when featured in advertisements (Fischer et al., 1993; King et al., 2020; Mays et al., 2019). For example, in a cigarette ad study, health warnings with black and white text letters on a yellow background generated higher warning recall than yellow text on a black background (King et al., 2020). In addition, health warnings featured on red backgrounds embedded into the ads were found to be more effective than health warnings on white backgrounds in terms of decreasing consumers' positive perceptions about e-cigarettes as an outcome (Mays et al., 2019). As of 2020, however, it appears that colours has not been manipulated on e-cigarettes (King et al., 2020).

Size. Another study found that a larger (20% of the ad space) image-based warning received greater attention than a text-based warning; however, no significant differences were found between image warnings occupying 20% and 33% of the ad space (Klein et al., 2015). Similarly, two other studies in the same context found that image warnings occupying 10% versus 25% of the ad space did not differ significantly in terms of ad appeal, recall, purchase intentions, or the trustfulness of the claims made in the ad regarding the product (Stark et al., 2008), and text warnings occupying 20%, 30%, or 50% of the ad space displayed on either white or red backgrounds did not differ significantly in terms of ad attention, recall and product perceptions (Mays et al., 2019).

Despite some evidence of the effects of health warnings in ads, there is a lack of research on the impact of health warnings in alcohol advertising. The following section discusses studies that explored the effects of health warnings and self-regulated "drink responsible" messages in alcohol ads.

Health Warnings in Alcohol Ads. Due to the requirements for mandatory alcohol advertising health warnings in the United States, previous research has mostly focused on this jurisdiction. For instance, an early study compared audio warnings with video warnings (Smith, 1990), and another study tested differences between standard text health warnings in print ads with audio health warnings (Barlow & Wogalter, 1993) both found that more prominent health warnings are more effective and the content of the message likely affected their effectiveness. MacKinnon and Lapin (1998) found that the content of the alcohol ads decreased consumers' perceptions of the risks associated with the alcohol product. However, a subsequent experiment reported in the same paper found that alternative warning designs (compared to the government pregnancy and drink-drive warnings) were more effective in terms of decreasing the persuasive effects of the alcohol ads, and the ads themselves were not distracting and did not decrease the effects of the health warnings in response to the alternative warnings (Mackinnon & Lapin, 1998).

Noel and Lakhan (2021) measured self-reported drinking intentions after exposure to the US government warning and mental health, pregnancy, minors, liver cirrhosis, cancer, and addiction mock health warnings. The study also compared antidrinking, pro-drinking, and industry-sponsored messages across six ads promoting spirits, wine, and beer brands, with findings suggesting that compared to the control group, exposure to warning labels in the form of user-generated comments was associated with a decrease in drinking intentions. Whereas pro-drinking, antidrinking, and responsibility messages did not influence intentions to drink (Noel & Lakhan, 2021). Similarly, Noel (2021) tested mental health, drink drive, pregnancy, cancer, and addiction health warnings across spirits, wine, and beer alcohol ads on social media. Again, the warnings

were posted as a comment underneath the social media ads and were compared against control groups, pro-drinking, antidrinking comments, and industry-sponsored (responsibility) messages. It was found that warning labels posted as comments did not differ significantly from industry-sponsored messages and that anti-drinking comments decreased purchase intentions significantly more than warning labels (Noel, 2021). It is noted, however, that the responsibility messages were embedded in the ads, whereas the warning labels were not. That said, both studies measured warning labels which were posted as comments and were not directly embedded in the social media alcohol ads.

Responsibility Messaging in Alcohol Ads. Studies on responsibility messages in alcohol ads suggest that these messages are ineffective in terms of decreasing viewers' intentions to purchase alcohol products (Noel, 2021) and that they do not provide health information but act as a promotional tool when embedded in alcohol ads (Smith et al., 2014). Other studies found that attractive alcohol cues drew more attention to the ads than to drink responsibly messages, thus highlighting the importance of alcohol ad content and the limited design of these messages acting as warnings (Farace et al., 2020; Kersbergen & Field, 2017b).

Central to the PHAAin Ireland, other scholars examined 13 accounts of alcohol brands on Twitter to determine the type of health information disseminated through tweets and whether mandatory warnings will improve the communication of health information in alcohol marketing (Critchlow & Moodie, 2022). Using content analysis, 554 tweets were examined with only some tweets included industry self-regulation (drink responsible messages) and none featured a cancer-focused or a pregnancy health

warning with a link to a website providing health information, all of which will be required by the Irish Act (Critchlow & Moodie, 2022).

The literature thus far has distinguished between voluntary (industry-sponsored) drink responsible messages and health warnings mandated by law. From Chapter 2, it is evident that some studies often refer to self-regulation and that voluntary warnings do not work. However, this distinction does not seem helpful as drink responsibly messages do not contain health information and are unlikely to undermine the commercial objectives of alcohol advertisements (or product packaging). Health warnings required by law are not restricted by the same concerns and aim to serve public health objectives using a format designed to communicate the health risks associated with alcohol consumption, independently of commercial interests. It appears that it is for these reasons, not self-regulations, that voluntary drink responsible messages are ineffective.

3.5.2 The Impact of Ad Content on the Effectiveness of Health Warnings

Ad Content–Alcohol. French scholars conducted pioneering research on alcohol advertising warnings in the context of the French law, which has required warnings to be placed on products and ads since 1991 (Gallopel-Morvan et al., 2017). The study by Dossou et al. (2017) is of significant interest in this regard, as it was the first attempt to explore the issue of alcohol ad content by comparing the effects of two types of ad formats on the noticeability of a health warning embedded in all alcohol ads in France. While they mainly focused on the effects of the ad content rather than the warning designs, Dossou et al.'s qualitative findings indicated that an ad format portraying a

colourful and luxury bottle of Moët and Chandon champagne made the French health warning “alcohol abuse is harmful, drink with moderation” less impactful in the presence of positive ad cues (Dossou et al., 2017). However, a follow-up experiment conducted by the same group of scholars, in which the ad format and the design characteristics of the government health warnings were simultaneously manipulated, did not observe any differences in the noticeability of the warning in different ad formats (Diouf & Gallopel-Morvan, 2020).

Ad Content–Other Domains. A factorial experiment conducted by Niederdeppe et al. (2019) was the first study to compare single-text and image-and-text cigarette health warnings in ads displaying social cues (the presence of people smoking) and ads featuring only the tobacco product. Their experiment included four experimental conditions to examine the design of health warnings (texts vs. images) and the content of cigarette ads (ads with and without social cues), including a US warning required by law as a control group. The study found that an image-based warning was associated with higher negative emotions than a single-text warning. However, the warning designs did not lead to significant differences in terms of the risks perceived by the participants, and there was no interaction between the warning designs and the content of the cigarette ads on any of the outcome variables (Niederdeppe et al., 2019). As the same participants were exposed to a number of examples of text accompanying the health warnings, the inconsistencies with the experimental stimuli may explain some of the study findings.

Another study which examined health warnings on soft drink ads found that the effects of health warnings depend on the content and design of the ad, and suggested that

emotional ads with appealing imagery and a health warning were less likely to decrease teenagers' purchase intentions for the advertised product than a rational ad featuring only the product with a health warning (Effertz et al., 2013). However, it is not clear whether this is due to the study design, which used less prominent warnings and thus, the warnings may have been unable to compete with the marketing elements used in the study. In addition, although the text accompanying the warnings was consistent across experimental conditions, the ad background on which the health warnings were featured was not the same: The rational ad featured a warning against a white (neutral) background, whereas the emotional ad featured a warning against a black (neutral) background. Again, this inconsistency may have undermined the internal validity of the experimental manipulation.

Finally, Hammond et al. (2021) examined the impact of health warnings featured in non-alcoholic beverage ads, particularly ads promoting Fanta, Sprite, and Coca-Cola, to determine if health warnings undermine the commercial objectives of these ads. Their findings suggest that the inclusion of a warning (e.g., "drinking beverages with added sugar(s) can cause weight gain…") did not decrease ad and brand recall, and no significant differences in consumers' perceptions of the ad content were found between those who viewed a health warning and those who did not. The authors conclude that including health warnings in non-alcoholic beverage ads did not distract the participants' attention from the ads themselves and did not have a negative impact on their perceptions of the product (Hammond et al., 2021). However, the findings might be due to the warning's design (particularly their size), as it appears that the authors tested a warning featured on 10% of the ad space.

Considering that alcohol ads and health warnings are communication tools that facilitate different narrative comprehension, the elaboration likelihood model (ELM) can help explain whether attractive ad content may counteract health warnings. Linking this argument back to the research evidence discussed above, the design of health warnings is even more important in this context, as the presence of additional background information demands that health warnings must be visually prominent to induce positive reactions in viewers. The following section reviews the elaboration likelihood model [ELM] (Petty & Cacioppo, 1986) in an attempt to explore whether health warnings featuring negative content can be overshadowed by alcohol ads featuring positive content.

3.6 The Elaboration Likelihood Model [ELM]

The ELM (Petty & Cacioppo, 1986) is a theory concerned with the process of persuasive communication and message elaboration (Lien, 2001). Some of the key strengths of the ELM over other attitude formation theories, such as the theory of planned behaviour and theory of reasoned action (Ajzen & Fishbein, 1980), is the inclusion of the dual-process pathway in understanding decision-making (Wang et al., 2019) and the integration of several moderating constructs to help explain the process of persuasion. Petty and Cacioppo (1986) emphasise that persuasion occurs via peripheral and central routes—with the level of persuasion depending on various factors, including message characteristics, source, credibility, context, and personal relevance of the message.

According to the model, persuasion via the central route is based on strong message arguments that require cognitive elaboration for individuals to form judgements that lead to attitude change, whereas persuasion via the peripheral route involves changes in attitudes based on simple, heuristic cues that are more commonly associated with visual features to form attitudes about a particular behaviour (Petty & Cacioppo, 1986). Furthermore, whether a message is processed by the peripheral or central routes depends on individuals' willingness and personal motivation to think about the content of the message (Oh & Jasper, 2006).

The ELM model has been used in studies of health warnings on alcohol products as a way of explaining the positive effects of image-based warnings, particularly that they do not require much cognitive effort and are thus processed through the peripheral route, whereas text-based warnings are naturally more cognitive in nature and likely to be processed via the central route (Bradu et al., 2014; Muñoz et al., 2013; Strahan et al., 2002). Given that images have been used to support text claims in order to increase persuasion (Andrews & Netemeyer, 1996), some researchers argue that persuasion can occur simultaneously through both the peripheral and central routes (Bradu et al., 2014). The ELM has also been used as a guiding theoretical framework in marketing and consumer behaviour research and, more generally, has been applied in over 120 academic articles in marketing (for a review, see Schumann et al., 2012), with these papers specifically focusing on advertising (for a review, see Shahab et al., 2021) and social media (Teng et al., 2014; Wang et al., 2019). Despite its widespread use and over 30 years of academic research, the model is not without limitations. For example, researchers have criticised the ELM for being a descriptive rather than an analytical model and for being outdated, particularly in contemporary marketing communications

practice (for a review, see Kitchen et al., 2014). Furthermore, Kitchen et al. (2014) argued that the ELM-related constructs that potentially impact the elaboration process have typically been reviewed in the literature as "stand-alone" constructs rather than integrated dimensions. Indeed, very few studies have reported findings for all dimensions of the ELM, and the studies that did were conducted by the same team of researchers who developed the model (Kitchen et al., 2014). While this thesis does not examine the components of the ELM framework, the model provides an understanding with respect to the contextual factors impacting elaboration in the context of advertising. More specifically, the key peripheral cue of interest in this dissertation is that of social imagery in an alcohol ad where people are portrayed having fun in a social setting, which may cause viewers to have a negative assessment of health warnings.

For instance, ads with celebrity endorsements represent peripheral cues with greater persuasive power due to the characteristics of the endorser, which increases the effectiveness of the message and the attractiveness of the product (Petty et al., 1983). Petty and Cacioppo (1986) argue that advertisers typically rely on peripheral cues to simplify the elaboration process to achieve the desired effects. Similarly, previous content analyses that tested the ELM principles argue that the effectiveness of print ads depends on peripheral cues, with the findings suggesting that rational ads lead to logical decision-making about the quality of the products based on information, whilst appealing and attractive ad-related imagery influence behaviour through affective reactions based on feelings (Durmaz et al., 2016). Another study found that the appealing features of alcohol ads were associated with the peripheral route, and the peripheral cues can determine the level of engagement with the central route (Agostinelli & Grube, 2002).

Applying these findings to alcohol advertising health warnings would suggest that product-oriented ads could stimulate more elaboration on a health warning, and this was seen in a study on alcohol product warnings which found that the combination of plain alcohol bottles with prominent cancer health warnings reduced consumers' positive perceptions about the product compared to standard bottles (Al Hamdani & Smith, 2015). Based on the model, health warnings and advertising designs appear equally important in the persuasion process.

3.7 Conclusion

This chapter highlighted the relationship between alcohol marketing and drinking behaviour and provided an overview of studies that have evaluated the effects of ad content, which has involved both social and product-related imagery, and how content influence consumer reactions. The chapter also reviewed studies of health warnings embedded in ads across different domains and illustrated that limited research evidence on alcohol advertising health warnings is available, with some of these studies focused on the effects of the ads themselves in conjunction with warnings, whereas others explicitly focused on the design of health warnings without considering the content effects of advertisements. Although the studies evaluated in this chapter represent significant contributions to the literature on health warnings, some of these are also subject to methodological limitations, particularly in relation to the internal validity of the experimental manipulations and stimuli used to run the experiments.

Importantly, the literature has overwhelmingly focused on evaluations of health warnings in the context of tobacco advertising in the US and Canada, typically focusing

on diverse outcomes such as ad appeal (e.g., Stark et al., 2008), brand attention (e.g., King et al., 2020), purchase intentions (e.g., Effertz et al., 2019) and health warnings recall using eye-tracking methodology (e.g., Mays et al., 2019). These issues highlight the necessity of distinctive outcomes when studying alcohol advertising health warnings and the requirement for research to place a greater emphasis on warnings-related outcomes which include recall of and the believability of warnings (i.e., not just ads), knowledge, perceived risks of alcohol use, negative emotions, and self-efficacy. These variables are all precursors to behaviour and will inform policymakers on the effectiveness of health warnings.

Finally, the ELM was reviewed more closely in an attempt to explain whether the exclusion of social imagery can increase the efficacy of health warnings, especially as many of the studies reviewed did not use theory to support their findings and varied greatly in terms of the types of health warnings and ad designs they examined.

CHAPTER 4: RESEARCH PROPOSITIONS AND HYPOTHESES

Research gaps, research propositions, hypotheses

4.1 Introduction

A thorough review of the literature (Chapters 2 and 3) allowed the researcher to explore the theoretical background and gaps in the health warnings literature. This chapter can broadly be broken into three key areas and is organised as a follows: a brief background of the research gaps and how health warnings have been conceptualised in the literature. From this, three research propositions are offered, series of hypotheses are proposed and chapter conclusions are then provided.

4.2 Research Gaps

To rationalise the research aim and objectives, the research gaps need to be specified. While the lessons from the evidence on alcohol product health warnings may be successfully applied to the context of alcohol advertising, there remains scant research in this area, with a limited number of studies conducted. A lack of formalised policy on advertising health warnings may be a contributing factor to the paucity of research and overall lack of progress. However, this is likely to change as the PHAA introduced in Chapter 1 stipulates the inclusion of multiple health warnings on alcohol ads which is a novel policy component for alcohol advertising and is one which has not been legislated for in other jurisdictions. With the introduction of this component of the PHAA, the need for research on how individuals react to such health warnings is of paramount importance and is thus the first gap that the current research will address. No published

work to date has investigated health warnings containing shocking imagery, multiple-text health messages related to cancer, mental health, and response-efficacy messaging in the form of a website link for more information on alcohol consumption.

The second gap relates to the impact of alcohol ads on the health warnings efficacy, particularly, *how* health warnings perform when featured in alcohol ads. As discussed in previous chapters, persuasion theories have been studied to understand how health warnings influence health-related behaviours, with findings supported by the literature on product health warnings. Although several studies have been conducted on warnings embedded in tobacco ads (e.g., Davis & Burton, 2016; Mays et al., 2016; Niederdeppe et al., 2016; Stark et al., 2008), there is a dearth of research which takes into account the efficacy of health warnings according to the content of ads (Dossou et al., 2017; Diouf & Gallopel-Morvan, 2020; Niederdeppe et al., 2019), and no studies have specifically compared alcohol ads with and without the presence of people drinking in a social setting which is the third gap to be addressed in this thesis. Given that Sect. 13 of the PHAA further proposes content restrictions on all alcohol ads, this study examines whether social imagery ad content explains any observed effect of health warnings on consumer reactions, particularly with respect to whether alcohol ads with social imagery decrease warning effects and also whether consumer reactions to health warnings differ according to the content of alcohol ads.

4.3 Conceptualisation of Health Warnings

The goal of health warnings is to communicate the health-related harms associated with unhealthy consumption and to induce cognitive, affective, and behavioural reactions in

consumers (Francis et al., 2017; Hassan & Shiu, 2018; Noar, Hall, et al., 2016). Two conceptual frameworks provide a structure to guide investigators when evaluating warnings–the information processing framework, based on McGuire's (1985) earlier model on decision-making (Argo & Main, 2004), and the message impact framework (Noar, Hall, et al., 2016). Both models indentify key processes and outcomes from persuasion and information processing theories.

For instance, Argo and Main's (2004) model proposes several stages of the warning's degree of influence on behaviours through the following persuasive pathway:

- attention
- comprehension, understanding and recall – constructs associated more closely with health warning designs and the extent to which those warnings are noticeable and readable to increase awareness and attention
- judgement, referring to individuals' risk beliefs, perceptions, attitudes, and propensity to believe the content messages
- behavioural compliance, relating to motivation to change behaviour (Argo & Main, 2004)

Further, the classification proposed by Noar and colleagues (2016) divides the effectiveness of alcohol health warnings into similar core constructs related to the persuasion process:

- health warning designs
- attention and recall

- cognitive and affective warning reactions
- attitudes and risk beliefs
- intentions and behaviour (Noar, Hall, et al., 2016)

Collectively, both frameworks illustrate that the presence (or lack) of warning effects occurs at all stages of the persuasion process and can give policymakers and researchers a good overview of the most impactful warning designs (Moodie et al., 2010). Although studies vary in the individual constructs examined, a consensus exists that the impact of health warnings on psychological mediators, also known as intermediate outcomes, should be studied rather than solely focusing only on the direct effects of health warnings on drinking behaviour (Andrews et al., 1991; Argo & Main, 2004; Noar, Hall et al., 2016).

The analysis of the impact of health warnings in alcohol ads is at the core of this research study. Together, the key outcomes outlined by Argo and Main (2004), and Noar, Hall et al. (2016) could be considered the invisible hand which guides the current research. As a result, the study proposes three research propositions, consisting of a specific set of hypotheses which are discussed next.

4.4 Research Proposition 1

Health warnings in alcohol ads (multiple-text, single-text, and image-and-text) will have an impact on consumer cognitive and affective reactions.

A large body of evidence indicates that the influence of health warnings on recall, cognitive and affective reactions is dependent on their design format, layout, type, and colour. Therefore, considerable attention has been given to the design of health warnings, especially in the context of products (Argo & Main, 2004; Dimova & Mitchell, 2021; Dossou et al., 2017; Pang et al., 2021; Purmehdi et al., 2017; Roderique-Davies et al., 2020).

4.4.1 Recall

Studies indicate that more prominent health warnings increase individual levels of recall (Argo & Main, 2004; Hobin et al., 2020; Noar, Hall, et al., 2016; Purmehdi et al., 2017) and that voluntary "drink responsible" messages are less likely to be recalled due to inconsistencies in format, the presence of vague messages, and the lack of standardisation in overall design characteristics (Critchlow et al., 2020; Jones et al., 2021; Kersbergen & Field, 2017a; Roderique-Davies et al., 2020). Similar findings about health warnings in alcohol ads suggest that voluntary warnings in alcohol ads are not effective (Farace et al., 2020; Kersbergen & Field, 2017b) and that larger warnings with pictograms are more likely to be understood and noticed in an advertising environment (Dossou et al., 2020).

A series of previous studies examining health warnings in cigarette ads found differences in recall scores, depending on the warning designs, with findings typically favouring image-based health warnings (Klein et al., 2015; Stark et al., 2008; Strasser et al., 2012). However, whether health warnings refering to multiple-health conditions are more effective on recall relative to a single-health condition remains unexplored for

alcohol ads, and there seems to be no study that has examined possible differences between multiple-text, single-text, and image-and-text health warnings on this outcome. Furthermore, research on cancer health warnings in alcohol ads and recall is even more limited, with no studies to date that have measured their efficacy. As this combination of design characteristics has not been compared in alcohol ads, the following hypothesis is proposed.

> H1: The type of health warning designs will significantly predict whether the participants will recall the health warning concept.

4.4.2 Believability of Health Warnings

As discussed in previous chapters, there are particular designs that are more likely to draw attention to the warning message and lead to greater elaboration and judgment (Argo and Main, 2004; Purmehdi et al., 2017). To gain more understanding of the effectiveness of alcohol health warnings, prior research has asked participants if they believe the content of the health warnings (Andrews & Netemeyer, 1996; Miller et al., 2016; Pettigrew et al., 2014; Winstock et al., 2020), especially as health warning believability is viewed as a significant precursor to decreased alcohol consumption (Dimova & Mitchell, 2021).

What stands out in the literature on alcohol product warnings is that some studies have examined the believability of current warnings, whereas others have examined mock warnings especially related to fatal cancers (see Chapter 2). For instance, a study in the United States found that the government alcohol health warnings illustrating the

possible harms of drinking while pregnant or operating machinery generated higher believability than mock (fictitious) warnings focusing on cancer and addiction (Andrews et al., 1991). Studies also found that the level of believability of cancer warnings on alcohol products can differ depending on their format and wording and that more specific cancer-focused warnings were perceived to be more believable than general warning statements (Andrews & Netemeyer, 1996; Blackwell et al., 2018; Miller et al., 2016; Pettigrew et al., 2014).

Furthermore, a cross-sectional survey on a representative sample of 75,969 participants across 29 countries investigated the perceived believability of health warnings statements about mental health disorders, violence, cancer, and heart and liver diseases, and although they were not displayed on alcohol bottles or ads, cancer-focused statements were perceived as less believable than statements related to other alcohol-related health risks (Winstock et al., 2020). Similar results reported elsewhere suggest that more common risks associated with alcohol, such as liver disease and drink-driving, were rated as more believable than mental health and cancer messages (Maynard, Blackwell, et al., 2018). From this it can be seen that cancer warnings on alcohol product labels are perceived to be less believable than other warnings which may be explained by a lack of consumer awareness of the link between alcohol and fatal cancers (Bates et al., 2018; Buykx et al., 2015; Kokole et al., 2021; Morgenstern et al., 2021; Winstock et al., 2020).

Given that believability differs based on the warning's content and message framing (Anshari et al., 2018), it is possible that individual propensity to believe health warnings in alcohol ads would also differ based on their design. Hence, it is important to evaluate

believability when assessing the relevance and effectiveness of multiple-text health warnings (refering to multiple health conditions including cancer, mental health and pregnancy) and single-text health warnings (refering to cancer), with and without a shocking image. To reflect this, a hypothesis is proposed.

> H2: Participants' propensity to believe health warnings will differ significantly for alcohol ads with multiple-text, single-text, and image-and-text health warnings.

4.4.3 Negative Emotions (Affective Reactions)

As evaluated in Chapter 2, research in the area of fear appeals has demonstrated the importance of fear in increasing the effectiveness of health warnings, and the research on tobacco warnings has consistently shown that shocking images placed alongside text is an effective combination for increasing negative emotional reactions in consumers (Francis et al., 2019; Noar et al., 2020; Noar, Francis, et al., 2016; Noar, Hall, et al., 2016). However, the literature thus far has focused solely on image-based and text-only health warnings to determine the most impactful design combination with respect to affective reactions (e.g., Hall et al., 2020; Ma, 2021; Morgenstern et al., 2021; Stafford & Salmon, 2017; Wigg & Stafford, 2016), and there is no research that has considered the influence of multiple health warnings in alcohol ads on negative emotional reactions.

Furthermore, there is mounting evidence linking alcohol consumption to several types of fatal cancers (Bowden et al., 2014; European Commission, 2021; Hydes et al., 2020;

Rehm et al., 2019; Rehm & Shield, 2020; Rovira & Rehm, 2021; Rumgay et al., 2021), and researchers have highlighted that the public should be made aware of this causal link through the implementation of cancer warnings (Babor, 2020; Kokole et al., 2021; May et al., 2022; Rovira & Rehm, 2021; Stockwell et al., 2020; Vallance et al., 2018). This is the main emerging area in the literature on alcohol health warnings (for reviews, see Dimova & Mitchell, 2021; Kokole et al., 2021) and the following hypothesis is proposed to examine which combination of warning designs in alcohol ads will be perceived as more emotive and lead to higher negative emotions.

> H3: Negative emotions will differ significantly for alcohol ads with multiple-text, single-text, and image-and-text health warnings.

4.4.4 Perceived Personal Risks of Alcohol Use

Studies in the literature on product health warnings have assessed perceived risks in terms of the perceived harm of smoking (Moodie et al., 2010), cognitive elaboration such as thinking about the health risks of risky behaviours (Pang et al., 2021), and perceived risks of tobacco use or specific harms (Kaufman et al., 2020). Much of this work focuses primarily on product warnings, with experimental and longitudinal evidence suggesting very limited effects of image-based warnings on the perceived severity and likelihood of harm (Noar et al., 2020; Noar, Francis, et al., 2016; Noar, Hall, et al., 2016).

From Chapter 2, it is also evident that perceived risks have been examined differently across studies on alcohol product labels, and results often differ based on the

methodologies used and frequency of exposure (e.g., Argo & Main, 2004; Ma, 2021; Scholes-Balog et al., 2012; Sillero-Rejon et al., 2018; Staub & Siegrist, 2022; Wigg & Stafford, 2016). For example, exposure to health warnings on alcohol product labels had little to no influence on perceived risks in the case of one-off exposure to health warnings (Argo & Main, 2004). Similar conclusions were drawn from a systematic review with text-based warnings about drink-driving and pregnancy in the US, which were ineffective in increasing perceived risks of alcohol use after repeated exposure (Scholes-Balog et al., 2012).

Essentially, repeated exposure to health warnings can increase awareness and behavioural compliance, but it can also decrease their effectiveness over time (Purmehdi et al., 2017). However, experimental studies are concerned with one-off exposure to health warnings by focusing on stimuli variations to determine which combination of warnings design can modify individual perceived risks perceptions (Ma, 2021; Morgenstern et al., 2021; Wigg & Stafford, 2016). Thus, it is hypothesised that:

> H4: Perceived personal risks of alcohol use will differ significantly for alcohol ads with multiple-text, single-text, and image-and-text health warnings.

4.4.5 Self-Efficacy to Drink Less Alcohol

Self-efficacy is theorised as an important construct in the protection motivation theory [PMT] (Rogers, 1983), extended parallel process model [EPPM] (Witte, 1992), and elaboration likelihood model [ELM] (Petty & Cacioppo, 1986). These models indicate that individuals with high self-efficacy are more motivated to protect themselves from

the threat associated with risky behaviours and are thus more likely to change their behaviour, whereas those with low self-efficacy are less likely to quit or modify their behaviour (Kinard & Webster, 2010). Similarly, the EPPM suggests that fear appeals must increase perceived self-efficacy to be effective and are more effective for those with high self-efficacy levels (Stefan, 2012).

As discussed in Chapter 2, some studies found that the impact of health warnings was attributed to high self-efficacy (Hall et al., 2020; Ma, 2021; Maynard, Blackwell, et al., 2018; Sillero-Rejon et al., 2018), whereas others did not observe significant differences in consumer responses to health warnings based on their self-efficacy levels (Romer et al., 2018) and did not find direct effects of graphic warnings on self-efficacy (Noar, Hall et al., 2016). Therefore, it is hypothesised that:

> H5: Self-efficacy to drink less will differ significantly for alcohol ads with multiple-text, single-text, and image-and-text health warnings.

4.4.6 Knowledge of the Health Effects of Alcohol

Knowledge is an important predictor of behaviour and in the context of health warnings is defined as the extent to which one knows of the harmful effects of unhealthy consumption (Noar, Francis, et al., 2016). As previously discussed, researchers have highlighted the lack of consumer awareness with respect to long-term alcohol-related diseases such as fatal cancers (Bates et al., 2018; Buykx et al., 2015; Kokole et al., 2021; Morgenstern et al., 2021; Thomson et al., 2012; Winstock et al., 2020) and that

knowledge is a modifiable predictor of attitudes towards alcohol policies (Hobin et al., 2020; Stockwell et al., 2020; Vallance et al., 2018; Weerasinghe et al., 2020).

Studies found that exposure to cancer-focused warnings can increase knowledge of the link between alcohol and cancer, as well as that the more knowledge people have of alcohol risks, the more supportive they are of cancer health warnings on alcohol products (Hobin et al., 2020; Vallance et al., 2018; Weerasinghe et al., 2020). However, there exists conflicting evidence for cancer warnings as a predictor of increased knowledge of alcohol-related harm, with findings from experimental studies indicating that exposure to a cancer warning had no significant impact on knowledge (Gold et al., 2021) and that text and image-based warnings did not differ significantly on knowledge about cancer, pregnancy problems, and liver diseases (Morgenstern et al., 2021).

As the literature on alcohol health warnings is in its infancy, knowledge as a construct has been less frequently examined. It is unknown whether a single exposure to cancer and multiple-text health warnings in alcohol ads will modify individuals' knowledge of the health effects of alcohol, as well as which form of design would be more impactful. Hence, the following hypotheses are proposed:

> H6: Participants' knowledge of the health conditions shown on the warnings (cancer, mental health, and pregnancy) and the health conditions not shown on the warnings (liver, drink-drive, and addiction) will differ significantly between those exposed to the health warning conditions and those who were randomised to the control groups.

4.5 Research Proposition 2

The impact of health warnings will depend on the content appeal of alcohol ads.

The main purpose of alcohol advertising is to encourage consumption, whereas health warnings aim to inform and reduce consumption. This conflict has become a topical issue of debate in the literature as the creative content in ads may undermine the efficacy of health warnings (Dossou et al., 2017, 2020; Diouf & Gallopel-Morvan, 2020). This is a particularly interesting area of research, and much can be learned from the breadth of evidence on tobacco, particularly the legislation on tobacco plain packaging where packaging carries only the cigarette brand name (Hammond, 2010). The specific objectives of this tobacco legislation are to minimise the impact of marketing and to reduce the positive appeal of tobacco-related products (World Health Organization, 2014).

The stark contrast between a blank package and health warnings has been shown to enhance the noticeability of tobacco health warnings, which has led to similar research studies examining the effect of plain packaging for alcohol products. For example, an experimental study by Al-hamdani and Smith (2015) found that health warnings on plain bottles were more noticeable and reduced participants' positive perceptions about the product compared to ordinary bottles without warnings. Thus, the legislation on plain packaging and research findings in this context illustrate the significance of other contextual measures, which should be considered in research on health warnings (Al-hamdani & Smith, 2015).

This dissertation identifies the content of alcohol ads as one such important contextual measure when examining health warnings in ads, as it is unknown whether alcohol health warnings will perform differently to that of those on products (Grummon & Hall, 2020). To address this, the following hypothesis is proposed.

> H7: The content of alcohol ads (product only vs. social imagery) will moderate the efficacy of health warnings on recall and consumer cognitive and affective reactions.

4.6 Research Proposition 3

The impact of health warnings will depend on demographic characteristics and drinking status.

The impact of health warnings has also been found to vary by demographic and alcohol use characteristics, and as such, are suggested for further research (Hassan & Shiu, 2018; Piper et al., 2021). In previous research, age, gender, and drinking status have been found to moderate the efficacy of health warnings. For example, a number of studies reported personal differences between age, gender (Mazis et al., 1991; Miller et al., 2016; Nohre et al., 1999; Pettigrew et al., 2014; Winstock et al., 2020), and drinking status (Annunziata et al., 2017; Creyer et al., 2002; Critchlow et al., 2020; Greenfield & Kaskutas, 1992; Jones et al., 2022; Miller et al., 2016; Winstock et al., 2020), with a general finding that different demographic groups respond differently to alcohol product warnings. More specifically, studies report conflicting research findings regarding demographics that prevent generalisations, with some populations more likely to

respond positively to health warnings than others, especially due to personal relevance (Winstock et al., 2020), susceptibility to health risks (Stockley, 2001), and differences in samples, methodologies, and warning designs used across studies (Hobin et al., 2020).

However, less is known about the effect of these characteristics with respect to warnings in alcohol ads (Noel, 2021; Noel & Lakhan, 2021) and as such are important to include in this research. The key question here is to determine whether demographics and drinking status will moderate the effect of health warnings, particularly whether some warning designs work with some demographic groups and not others. To address this question, the following hypotheses are proposed.

> H8: Age (H8a), gender (H8b), and drinking status (H8c) will moderate the efficacy of health warnings in alcohol ads on recall and consumer cognitive and affective reactions.

4.7 Conclusion

This chapter reviewed the research gaps that thesis aims to address and discussed three research propositions based on previous health warnings research across various domains. Eight hypotheses which were developed from a careful review of the health warnings literature were proposed to test consumer cognitive and affective reactions to alcohol ads with multiple-text, single-text, and image-and-text health warnings. The next chapter considers the methodological decisions and rationale for the study design.

CHAPTER 5: METHODS

Research design, quantitative analysis, experiments, measurement scales, sampling

5.1 Introduction

This chapter outlines the methodological decisions underpinning the study's research aim, which is to investigate consumer behavioural responses to health warnings in alcohol ads on key precursors to consumer behaviour. Adopting an experimental design allowed this study to examine differences in consumer cognitive and affective reactions as a result of one-off exposure to three different alcohol advertising warning designs, with a factorial between-subject experiment selected for data collection.

In this chapter, a definition of experimental methods is introduced, and the differences between single-variable experiments and multivariable experiments and between-subjects and within-subjects experiments are thoroughly described. Then, the rationale for selecting an experimental design and the justification for the development and selection of the experimental stimuli is discussed. A detailed description of each stage of the factorial survey development is presented, followed by the details of survey development, measurements, sampling strategies, and statistical analysis utilised for data analysis.

5.2 Definition of the Experimental Design

Experiments offer several advantages, the most important of which—from a research standpoint—is their ability to determine cause-effect links between variables (Patzer, 1996). Another unique aspect of the experimental design is the researcher's ability to manipulate variables of interest involving experimental and control groups, whereby the treatment group is exposed to the experimental manipulation and compared against a control group that receives no treatment (Loseke, 2012; Martin; 2008; Spickard, 2017). The participants are also randomly assigned to one group to enable a direct comparison and explanation of the effects of the treatment (Ryals & Wilson, 2005).

At the most fundamental level, the independent variable must have at least two levels to allow for comparisons to be made and to run an experiment successfully (Martin, 2008). One way to explain how individual behavioural responses will differ based on the design of alcohol advertising warnings can indeed be achieved by using experimental methodology where survey experiments can be used to manipulate the exposure of the participants to certain experimental stimuli, and then the participants' responses can be compared based on the experimental condition to which they were assigned (Dafoe et al., 2018).

Although experimental methods are robust and more commonly used in natural sciences and medical research (Patzer, 1996), they have become more frequently used in social sciences (Imai et al., 2013), including market research (Ryals & Wilson, 2005), sociology (for a review, see Wallander, 2009), psychology (Martin, 2008), political science (Clifford et al., 2020; Dafoe et al., 2018), and advertising (Geuens & De

Pelsmacker, 2017). Furthermore, randomised experiments are often combined with surveys in an online environment, and this approach has become a key methodological tool in social sciences. The use of cross-sectional surveys with randomised experiments has increased rapidly, especially with the digital developments that enable the distribution of surveys online (Dafoe et al., 2018).

5.2.1 Single Versus Multivariable Experiments

Martin (2008) highlighted two types of true single variable experiments, namely two levels (one treatment group and one control group) and multilevel (three or more treatment/control groups). The author then goes on to outline the fundamental difference between the two types of experiments where two-level experiments are thought to be more simplistic, as they involve simple measures of the relationship between one independent variable and one dependent variable, whereas multilevel experiments are designed with multiple levels of one independent variable. Although two-level experiments are relatively straightforward to conduct, interpret and analyse, they can only identify the presence (or the lack thereof) of main effects and determine whether one independent variable is worth examining further or not (Martin, 2008). On the other hand, multilevel experiments can determine the presence/absence of main effects and the nature of the relationship between variables. However, the major disadvantage of multilevel experiments is that the higher number of levels requires a larger sample size, and multilevel experiments are more time consuming to design and harder to analyse and interpret (Martin, 2008). The current study falls under the category of multilevel experiments, as it examined three different designs of alcohol warnings featured on two alcohol ads, with and without social imagery. To illustrate this point, the content of

alcohol ads is a two-level factor (a product-only alcohol ad vs. social imagery ad), and the design of warnings is a three-level factor (multiple-text, single-text and image-and-text health warnings).

5.2.2 Selection of Between-Subjects from Within-Subjects Experiments

It is noteworthy that exposing each participant to all experimental conditions is defined as a within-subject design, whereas comparing various groups of participants exposed to different conditions (across all independent variable levels) is considered as between-subject design (Charness et al., 2012). Table 5.1 represents this distinction. The key objective to identify whether significant differences exist between the warning designs in this study and to determine which is the most impactful on consumer cognitive and affective reactions calls for a between-subjects experimental design, as it enables comparisons of several outcomes between groups (Spickard, 2017). Possible interaction effects of the ad content and health warning designs can also be determined through between-subjects comparison (H2-a), and the rationale for the study design is further discussed in Section 5.2.

Table 5.1

Differences Between-Subjects and Within-Subjects Experiments

	Independent variable	**Level 1**	**Level 2**
Between-subjects		Participant one	Participant two
Within-subjects		Participant one	Participant one

Note. Adapted from Martin (2008) p.149.

Though each of these types of experimental design has advantages and disadvantages, there is no absolute determinant to suggest which is more appropriate, and the decision between between-subjects and within-subjects experiments should be guided by the research objectives, the nature of the research (e.g., the discipline) and the experimental procedures planned (Charness et al., 2012; Martin, 2008; Wallander, 2009). The purpose, strengths, and weaknesses of between-subjects and within-subjects experimental designs are illustrated in Table 5.2.

Table 5.2 *Within-Subjects Versus Between-Subjects Experiments*

Experimental design	Purpose	Strengths	Weaknesses
Within-subjects	Subjects exposed to more than one stimulus Variable is manipulated within a single subject (one participant)	A smaller sample size required Only one group for analysis brings statistical advantages	Higher risk of dropouts, as experiments take longer to complete Primary exposure can affect follow-up responses Easy for subjects to guess the purpose of the study (carry-over effects)
Between-subjects	Subjects exposed to one level of the independent variable Variable is manipulated between two or more subjects Preferred design and used more frequently	Collect more data for a specified condition It takes less time to complete Least biased because of randomisation Subjects are less likely to guess the real purpose of the study	Groups between conditions are quite different due to randomisation Tend to be more complex for researchers without a statistical background A larger sample size required

Note. Purpose, strengths, and weaknesses of between-subjects and within-subjects experiments as identified by Martin (2008, pp. 150-155)

5.2.3 Factorial-Between Subjects Experiments

Experiments become more complex if they require multiple treatments at one point in time (Clifford et al., 2020), and the most frequently used multivariable experiment is the factorial design, which is defined as the combination of multiple independent variables, called factors, with two or more values termed levels (Martin, 2008). This type of design requires random assignment of participants to treatment combinations and can be interpreted as a series of single-variable experiments, with various factors that can be between-subjects, within-subjects, or both. It is noteworthy that the use of between-subjects design is generally more prevalent in experimental studies as differences between factors can be established (Clifford et al., 2020).

Factorial designs have often been used in conjunction with surveys to investigate the effects of particular factors and are concerned with subjects' individual views and reactions to some informational content after exposure to the content (Dafoe et al., 2018). Due to its ability to measure multiple factors simultaneously, the factorial design allows experimenters to investigate the interaction effects between variables, particularly whether the influence of one factor is affected by the influence of another factor (Geuens & De Pelsmacker, 2017; Martin, 2008). Furthermore, researchers have emphasised the statistical benefits of factorial designs as estimated variability decreases when more factors are included, which leads to a greater likelihood of observing statistically significant results (Martin, 2008).

5.3 Research Method Rationale

Considering the aim of this thesis—which is to investigate consumers' cognitive and affective reactions to health warning designs in alcohol ads, a two alcohol ads (with vs. without social imagery) by three health warning designs (single-text vs. multiple-text vs. an image-and-text), with two control groups (alcohol ads without health warnings) factorial between-subjects experimental design was conducted. Instead of presenting the different health warning formats to all participants (within-subjects design), it was decided to show different groups of participants warnings of a single format (between-subjects design). Each alcohol ad contained a health warning or no warning (control), and the participants were randomly allocated to view one of eight experimental conditions, each containing two alcohol ads, accompanied by either a single-text, multiple-text, image-and-text warnings or no warning (control group), depending on the experimental condition. Each condition reflected a possible combination of two factors—one of which, the alcohol ad content, was measured at two possible levels, and the other of which, health warning designs, was measured at three possible levels.

From Chapters 2 and 3, it is evident that experimental designs are widely utilised in the literature on health warnings both on products and advertising and that the adoption of an experimental design was deemed necessary to address the objectives of the current research and examine the research propositions outlined in Chapter 4. A meta-analysis revealed that experiments and surveys are the most commonly used methods for data collection in the literature on health warnings across different disciplines (Purmehdi et al., 2017) and that experimental studies have produced valuable information about health warning designs and are, therefore, a recommended research method in this

domain (Hassan & Shiu, 2018; Purmehdi et al., 2017). However, experimental studies are not without limitations as they typically focus on short-term effects and do not capture the "real world" impact of health warnings on consumer reactions and behaviour. This limitation has also been aknowledged in the fear appeals literature (Chapter 2, Section 2.2.2)

Despite this, the rationale for the current work is based on the significant precedent for experimental studies that successfully examined the impact of health warnings on tobacco packaging (Francis et al., 2019; Noar, Hall, et al., 2016), tobacco advertising (Mays et al., 2016; Niederdeppe et al., 2019; Truitt et al., 2002), alcohol products (Clarke & Rose, 2020; Hall et al., 2020; Jongenelis et al., 2018; Jones et al., 2022; Ma, 2021; Morgenstern et al., 2021; Pechey et al., 2020; Pettigrew et al., 2016; Sillero-Rejon et al., 2018; Stafford & Salmon, 2017; Wigg & Stafford, 2016), and alcohol advertising (Diouf & Gallopel-Morvan, 2020; Lou & Alhabash, 2020). In addition, a recent paper reviewed 71 publications on alcohol warnings, with 46 that adopted an experimental methodology (Dimova & Mitchell, 2021).

A series of single between-subject, as an alternative to the single factorial design were evaluated. Having two or three experimental studies independent from each other would have allowed the researcher to examine the main effects and determine the differences between groups for all outcome measures of interest, but it would not have been possible to examine independent variables (factors) with multiple levels or test for interaction effects between the experimental variables and outcomes.

A within-subject design was also considered but was thought to be less advantageous as employing a within-subjects method would require each participant to view all of the health warnings in all formats and would not enable the researcher to establish significant differences between groups, as can be achieved through between-subjects randomisation (Charness et al., 2012). Finally, due to the presence of multiple factors, a between-subject design was thought to be more suitable, as it would prevent the study from being unnecessarily long.

Other potential research alternatives were qualitative, cross-sectional, and longitudinal methods. The possibility of conducting only qualitative research was discounted as experimental studies are widely used for health warning evaluations. Furthermore, quantitative research allowed for a more objective comparison between the design of health warnings on consumer reactions. Due to previous qualitative research on alcohol health warnings (e.g., Diouf et al., 2017; Robert et al., 2016) and recommendations for examining prominent (tobacco-style) health warnings (e.g., Al-hamdani et al., 2014; Hassan & Shiu, 2018), it was not considered necessary to conduct additional consumer research for the purposes of designing the experimental stimuli in this thesis. For instance, the Department of Health conducted a qualitative investigation with respect to the design of health warnings on alcohol products, and the author's decisions on warning designs were influenced by the qualitative findings which were highlighted in their report (Robert et al., 2016), the Eurocare Library of Health Warnings (Eurocare, 2014) and previous research on tobacco and alcohol health warnings as evaluated in Chapters 2 and 3 (more on this in Section 5.4.2). In addition, the author asked questions on the design of health warnings and the alcohol ads as part of an initial qualitative phase involving 10 cognitive interviews (see Section 5.5.2), with overall conclusions

that the experimental stimuli were reliable and realistic. However, it is by no means suggested that qualitative studies are not useful. Rather it is emphasised that quantitative and qualitative methods are complementary and that existing qualitative findings supplemented this thesis. Notwithstanding the above, qualitative studies have been suggested for future research as a follow-up of the findings reported here (see Chapter 7, Section 7.6.1), and an in-depth reflection on the candidate's PhD journey has been added to Chapter 7, Section 7.8.

Cross-sectional and longitudinal studies have also been considered as part of the research design. Cross-sectional studies have been used to examine the effects of alcohol product warnings on key antecedents of consumer behaviour, including awareness and recall of health warnings, judgement, warning reactions, and behavioural intentions (Annunziata et al., 2017; Coomber et al., 2015; Critchlow et al., 2020; Miller et al., 2016; Winstock et al., 2020), these research methods could not identify the most impact warning designs, cannot determine causal relationships between variables and do not involve randomisation procedures. On the other hand, a longitudinal methodology would not have been viable to conduct as the alcohol advertising warnings required by the Public Health (Alcohol) Act 2018 are not being introduced. Instead, experimental manipulations are more advantageous here, as the effectiveness of particular warning designs can be tested before introducing health warnings in the real world (Kokole et al., 2021).

It is important to note that there are limitations to conducting only a single study, particularly due to the reliance on only one context for gathering data. The key point here is to recognise this limitation as subsequent experiments could have extended the

study results as more variables and outcomes would have been examined. Although it was originally intended to conduct follow-up experiments using other means of convenience, Covid-19, time, and zero budget for data collection were significant barriers. After a number of failed recruitment attempts, it was decided not to conduct a second survey experiment for the purposes of completing this dissertation. On a relevant note, a factorial survey experiment consists of two or more single experiments at the same time, and the complexity of testing more than one factor in the same analysis has been acknowledged in the literature (Martin, 2008).

5.4 Designing the Experimental Stimuli

5.4.1 Alcohol Ads Design and Selection

As discussed in Chapter 3, alcohol consumption is a social activity, and advertisements are typically appealing in nature and may distract viewers from the health warnings. One of the current study objectives is to determine if an alcohol ad with social imagery will decrease the impact of the health warnings, and two alcohol ads were designed by a graphic design professional hired by the researcher to create an alcohol ad featuring product-only attributes and an alcohol ad with social imagery content featuring people drinking alcohol in a social setting (see Figure 5.1). A new beer brand was created for this purpose and was made as realistic as possible to existing Irish craft beers. The content of the newly created paired ads was designed to be similar to many other alcohol ads for well-known Irish brands, such as Guinness, Rockshore Lager, and O'Hara's. "Blue Wave" is an original brand name selected as it was important to create an authentic and unique name to avoid copyright implications.

It was decided to design a new brand for several reasons. First, pre-existing brand equity can influence participants' responses and make it harder to distinguish whether differences in the participants' responses are the result of brand awareness or the manipulation procedure (Geuens & De Pelsmacker, 2017). Second, using real alcohol brands could have created intellectual property concerns. Third, creating another brand would have required more personal funds as no institutional funding was available. In this study, while two different brands were not used, however, two different advertisements were used—one with social imagery and one without which is comparable to previous research (e.g., Niederdeppe et al., 2019).

Displaying three warnings on two ads with another brand would have increased the number of experimental conditions, which would have been difficult to interpret and analyse. Therefore, a decision had to be made about the number of factors to be investigated and whether to examine alcohol ads (product-only vs. social imagery) or different mock brands (e.g., beer, wine and/or spirits). In terms of the literature, some authors used fictitious ad and one brand (e.g., King et al., 2020), one real vs. one unreal brand/ad (Davis & Burton, 2016) or real brands and ads (Dossou et al., 2017; Niederdeppe et al., 2019; Noel, 2021; Noel & Lakhan, 2021). It is noted, however, that using more ads or brands is either based on separate between-subject experiments (e.g., Davis & Burton, 2016), wihin-subject designs (e.g., Sillero-Rejon et al., 2018) or fewer experimental conditions (e.g., Niederdeppe et al., 2019). For alcohol product warnings, while a common approach is to use existing brands (e.g., Jones et al., 2022; Ma, 2021), some authors utilised unfamiliar brands as part of their experimental manipulations (e.g., Maynard, Blackwell et al., 2018; Sillero-Rejon et al., 2018).

Sponsored alcohol ads were evaluated on an international level more generally and a national level more specifically. The search strategy was based on hashtags and keywords and a list of search terms was used to capture advertising beer-relevant content. Keywords such as “beer ads” “local beer” “popular beer ads” “beer” were used, including hashtags with variations of these, such as #beerads #irishcraft #irishbeers #irishcraftbeer #localbeers #internationalbeer #irishlager and #beerinstagram. Based on this, the author was able to identify that beer brands have often been promoted in a social setting and that social media users generate alcohol content in pubs. For instance, O Hara’s brand advertises its beer products in pubs and both genders are typically represented in alcohol ads with social imagery (see Appendix P). Islands Edge video ad in 2021 illustrates people (men and women) in a bar environment in Dublin. To generate ideas in terms of product designs, social media pages related to Irish craft beers were also followed. As a visual illustration, examples of real ads and brands are provided in Appendices P and O.

In new contexts where health warnings are embedded in ads, the investigation of more categories would be a more difficult task. Despite this, examining health warnings in the context of other product categories (wine, spirits and/or beer) was another research question that the author could have examined with a follow-up experiment rather than within the same between-subjects factorial design (See Chapter 7, Section 7.8). As a result, it was decided to select a product category that is familiar to the Irish market and has high levels of consumption and exposure among all age groups and gender orientations as it was important to avoid gender-specific product categories, which could be subjected to stereotyping. Given the study sample, capturing both genders across all age categories was considered important for data quality and statistical

comparisons. The selection of beer was reflected in the global production data for the category, which is higher than that of wine or spirits (Jernigan & Ross, 2020). In Ireland, beer consumption accounts for the highest proportion of all alcoholic products, with over 40% of the market share in 2021 and is also not gender-specific, with both men and women of all age groups consuming beer (Drinks Ireland, 2021). Furthermore, it was found that the most popular beverage category among young people in Ireland was beer (Hope, 2009) and many authors considered beer and/or wine in their experimental investigations (Annunziata et al., 2017; Ma, 2021; Maynard, Blackwell, et al., 2018; Pechey et al., 2020; Sillero-Rejon et al., 2018; Wigg & Stafford, 2016).

Given the prevalent use of social media for alcohol marketing purposes (for a review, see Noel et al., 2020), it was considered appropriate to focus on exposure to social media alcohol advertising. The ads used here do not represent traditional media such as radio or TV (e.g., video ads), and were mocked up as print ads (e.g., image-based sponsored content on social media). The actual research stage for the design of the alcohol ads began in April of 2019 and the alcohol ads design process and communication between the candidate and the graphic designer took place between July and September 2019. The aim was to finalise the design of the health warnings and alcohol ads prior to the author's PhD confirmation exam, which took place in February 2020. Alcohol-related websites (e.g., Guinness), Instagram, and Facebook accounts were reviewed by searching for national and international beer brands between January and April of 2019. Facebook and Instagram were chosen as part of the investigation as they are the most dominant platforms in Ireland (Statista, 2022). Two criteria were important here 1) to review ad content related to well-known beer brands in a national and international context and 2) accounts specifically referring to Irish craft beers. As

mentioned earlier, video-based ads were outside the scope of this study, and only the content of image-based postings was reviewed. To gather insights, more than 60 ads were evaluated by the researcher, and this resulted in a final selection of 10 ads serving as a "template" for design purposes (see Appendix O for visual examples). The parameters were to review 1) alcohol ads, including social imagery, the type of content, and how socialising is depicted and 2) product-related ads and their design features, e.g., how the bottle is positioned, the background, colours, what type of product information is included, presence or absence of a brand name, logo, slogan etc. Reference to holiday periods (e.g., Christmas, Easter, Halloween) were excluded as the evaluation was limited to representative themes during non-festive times. In addition, the graphic designer the author worked with was a knowledgeable professional with experience developing alcohol ads for the Tuborg (beer) brand, which was considered very beneficial from a design point of view for Blue Wave Lager.

In order to determine the appropriateness of the beer brand, as mentioned above, existing ads and previous studies that tested beer brands were reviewed. The brand characteristic (and whether it is considered realistic or not) was also judged by the participants who took part in the cognitive interviews, the designer, the supervisory team, colleagues, and the external examiner for the PhD confirmation in February 2020. For instance, during the cognitive interviews, the students were invited to comment on the ad designs. Some quotes from the cognitive interviews are provided below:

Interviewee (4) stated "The ad itself is nice. It makes you forget about the negative impact of alcohol – the ad promoted a beer with a blue label. Still, I don't remember the name, it was something related to the ocean." Interviewee (2) said "the ad was very

realistic, and I'd buy this beer if I'm to see it on the supermarket shelves." Finally, it should also be noted that (after data collection) the ads and warnings were subjected to feedback from experts, particularly the Irish Academy of Management, ACORN, and EUROCARE.

Figure 5.1

Alcohol Ad Designs

Product-Only Alcohol Ad

Social Imagery Alcohol Ad

Source: Author

In order to ensure the correct experimental manipulation in this research, there were no differences in the content of the two alcohol ads, except for the presence or absence of images of people – thus, the desired manipulation; the product type, brand name, colours, and overall layout were kept constant across the experimental conditions (see Figure 5.1). Indeed, the standard requirement for increasing the validity of the experiment is to ensure all elements within the alcohol ads are as identical as possible

(except for the manipulated components of interest), as failure to do so may affect the validity of the findings (Geuens & De Pelsmacker, 2017).

5.4.2 Health Warnings Design and Selection

Unlike products, the format of warnings placed in ads becomes even more critical due to the presence of arguably more appealing promotional elements, which may distract from the warnings themselves (Barlow & Wogalter, 1991; Dossou et al., 2017; Krugman et al., 1994; Stark et al., 2008). Appropriate health warning designs were set to reflect the three formats of interest: Single-text, image and text, and multiple-text health warnings and are in line with both the literature review in this area and the PHAA – see Table 5.3.

Table 5.3

Examples of the Respective Health Warnings Investigated in This Research

Health warnings	Health message	Source
Single-Text	• Alcohol can cause cancer of the mouth, pharynx, larynx, oesophagus, liver, pancreas, bowel and breast	Robert et al. (2016)
Shocking Image		Tobacco Labelling Resource Centre (2013)
Multiple-Text	• Alcohol causes mental health problems (1) • Alcohol can cause cancer of the mouth, pharynx, larynx, oesophagus, liver, pancreas, bowel and breast (2) • Drinking alcohol when pregnant harms your baby (2) • For more information, visit www.askaboutalcohol.ie (3)	1. Eurocare (2012) 2. Robert et al. (2016) 3. PHAA

The selection of the exact wording statement for the cancer warning was informed by the Eurocare library of alcohol health warnings (Eurocare, 2012) and by a report conducted by Amárach Research on alcohol product labels for the Department of Health in Ireland (Robert et al., 2016). Although this report was conducted to support Section 12 of the PHAA, which relates to alcohol product labels (i.e. advertising), the data collected from focus groups and a national survey of a representative sample of the Irish population was particularly useful, as the qualitative findings of the report indicated that the warning statement "alcohol can cause cancer of the mouth, pharynx, larynx, oesophagus, liver, pancreas, bowel and breast" was rated as more effective than "alcohol can cause cancer" (Robert et al., 2016 p.43). Furthermore, specific warnings in relation to fatal cancers need to be more widely disseminated (European Commission, 2021; World Health Organization, 2021), and the rationale for including cancer warnings in this research is well supported by the literature on alcohol product warnings, with previous studies indicating that health warnings related to fatal cancers could feasibly be used on alcohol products in the future (Al-hamdani & Smith, 2015; Babor, 2020; Dimova & Mitchell, 2021; Hassan & Shiu, 2018; Hobin et al., 2020; Weerasinghe et al., 2020).

The second experimental stimulus of interest to this research was the inclusion of an image to accompany the text on fatal cancers to further illustrate the negative health outcomes of these conditions. Although the use of images is not required by the PHAA the rationale for including an image as part of this factorial experiment was based on the theoretical grounds that health warnings with images can effectively increase attention and reduce tobacco consumption (Francis et al., 2017; Hammond, 2010, 2012; Hammond et al., 2012, 2013).thee promising findings associated with the effects of

health warnings with images on alcohol products have also been reported (Dimova & Mitchell, 2021; Ma, 2021; Pechey et al., 2020).

To meet this end, three sources were reviewed for relevant images that could accompany the text message: the European Commission Library on Health Warnings, the Tobacco Labelling Resource Centre, and the Eurocare Library of Alcohol Health Warning Labels. Based on these reliable sources, it was decided to include an image proposed for implementation in 2012 on tobacco packages in Canada (Tobacco Labelling Resource Centre, 2013). The chosen image was considered appropriate to reflect a warning depicting eight different types of cancer as it features someone who is seriously ill, without suggesting the type of cancer they might have (this is shown in Table 5.3). Similar to previous research (e.g., Ma, 2021; Jones et al., 2022), it was decided to select an image that could possibly enhance the text. According to Lochbuehler et al. (2018, p.2) "congruent pictorial warning labels portray an image (e.g., lungs) and textual information (e.g., "Cigarettes cause fatal lung disease") that reflect a common theme." To improve message congruency, a study by Lochbuehler et al. (2017) found that visual and textual information, if aligned, improves message recall. Similarly, Ma (2021) used very similar shocking images of cancer patients in their experimental study on alcohol product warnings and Jones et al. (2022) tested specific text warnings represented by an appropriate theme in relation to the text message. As the health conditions were eight, an appropriate generic image was selected so that it represents any type of cancer.

The third experimental stimulus refers to multiple-text health warnings and includes the same cancer message accompanied by the warning messages: "alcohol can cause mental

health problems," "alcohol consumption may harm the unborn baby," and refers the consumer to Ireland's Health Services (HSE) website where people can find drink awareness guidelines and support. The rationale for including a mental health warning and excluding other themes as for example violence, drink-drive, and anti-social behaviours was solely based on Section 13 of the PHAA. The Act specifies the inclusion of a general warning about the link between alcohol and health; therefore, only health-related themes were considered. Furthermore, findings suggest that mental health warnings present new information to consumers (Maynard, Blackwell et al., 2018) and while their impact was examined in research on alcohol product warnings (e.g., Jongenelis et al., 2018; Maynard, Blackwell et al., 2018), it appears that only two studies tested a mental health warning in alcohol advertising (Noel, 2021; Noel & Lakhan, 2021). These studies, however, were published after the author's data collection, suggesting that there was an opportunity to examine warnings focusing on mental health in alcohol advertising. Furthermore, there is a general trend of concern about mental health, with data suggesting that the country is represented with one of the highest rates of mental health problems in Europe (Health at Glance Report, 2016), and that alcohol consumption has been associated with depression, anxiety, and suicide, which is a significant area of concern in Ireland (Alcohol Action Ireland [AAI], 2021). Therefore, mental health was considered more topical and with a greater public salience.

As multiple warnings were examined, the inclusion of Irish language warnings was discounted as it would result in smaller text for all warnings which is likely to negatively impact their efficacy. While it is true that health warnings for tobacco products are also in Irish, this is not comparable as the context here is advertising, and not products. In addition, the tobacco industry is not permitted to use any branding

which means the plain packaging allows for much larger warnings which gives space to warnings in Irish. Additionally, the Department of Health conducted a study on different warning formats in the context of Sect. 12 of the PHAA without testing the warnings in Irish (Robert et al., 2016).

The content of the multiple-text warning, particularly referring to mental health problems and pregnancy, was also consistent with the recommendations for alcohol product health warnings provided by Eurocare (2012). However, due to some concerns over ambiguous wording with respect to the pregnancy warning, it was decided that the warning variant "alcohol consumption *harms* [emphasis added] the unborn baby" (Robert et al., 2016) sounds more conclusive than "may harm the unborn baby" and that the former message was thought to be more relevant for inclusion.

As for the wording of all warnings, the colours of the background and letters of the health warnings on ads should be carefully considered (Effertz et al., 2013; Strahan et al., 2002). Following the previous chapters, creating a contrast between the content message of the warnings and the ad-related promotional information was considered important . A red-based background with white letters was thus selected for all three health warnings based on previous warnings research which found the colour red was more impactful than other colours (Laughery et al., 1993; Laughery & Wogalter, 2006; Mays et al., 2019; Pham et al., 2017).

Furthermore, all warnings occupied 20% of the ad space and were identically positioned at the bottom of the alcohol ads, which follows the requirements of the United States Food and Drug Administration (FDA) for health warnings in cigarette ads (Federal

Register, 2020). This size ratio has also been used in previous research on tobacco advertising warnings (Davis & Burton, 2016; Mays et al., 2019; Wackowski et al., 2019), and the full study design is shown in Table 5.4. Additionally, a full-sized, enlarged copy of the images can be found in Appendix C.

Table 5.4

Factorial design: The Two Factors in Each of the Eight Experimental Conditions

Factor: Ad content	Condition	Social Imagery Alcohol Ad	Product-Only Alcohol Ad
Factor: Health Warning Designs			
Control group(s)	1 & 2		
No health warnings			
Single-Text	3 & 4		
Image and Text	5& 6		
Multiple-Text	7 & 8		

Source: Author

5.5 Survey Design

5.5.1 Modes of Data Collection and Administration

Data collection occurred at the start of the Covid-19 pandemic, with the first lockdown imposed in the summer of 2020. Reflecting on what impact Covid-19 had on fieldwork, it is noted that reaching out to students on campus was impossible as all TU Dublin campuses were closed. Furthermore, Public Affairs (who sent out the survey link in May 2020) were cautious that students were overwhelmed with Covid-19-related announcements/emails and were quite close to rejecting the author's initial request. Other universities also suspended access to their facilities, which impacted the author's alternative strategy to collect data from another institution. Finally, the Minister for Health was approached with a request to tweet the survey link on social media, but this request was not facilitated. The request may have been more likely accommodated in a pre-pandemic condition (a copy of the email can be found in Appendix N).

Essentially, the closure of restaurants and pubs and social distancing rules could have influenced levels of alcohol consumption. To account for potential implications for how participants report their alcohol consumption, the AUDIT-C questions were amended, asking the participants to think about their drinking patterns before the Covid-19 pandemic (see Section 5.5.3). While this approach may not eliminate bias completely, the current research does not measure drinking behaviour and harmful consumption patterns. Furthermore, research has shown that alcohol consumption decreased during the pandemic across Europe except for Ireland (Kilian et al., 2021), with 60.6% of drinkers reporting no change in alcohol consumption (Reynolds et al., 2021). The

findings in a cross-sectional study, with 2 waves of data collection, found that alcohol consumption did not differ significantly pre-and-during the pandemic in Ireland (Critchlow & Moodie, 2021).

Three types of surveys that dominate academic research include self-administered, face-to-face, and phone surveys (De Leeuw, 2001), and all types are particularly useful in examining attitudes, beliefs and behaviours (Bhattacherjee, 2012). Although more established, traditional means of data collection are typically associated with pen and paper, face-to-face interviewing, or phone-based surveys, many studies in social sciences have benefitted from the development of self-administered online questionnaires (Ball, 2019). Online surveys offer anonymity and confidentiality and are accessible, efficient, quicker and cheaper to conduct (De Leeuw, 2001). They can be web-based, computer-based, or electronic (Lehdonvirta et al., 2021) and are thought to be particularly useful when preparing, visualising, storing and analysing the survey (Nayak & Narayan, 2019).

Another important strength is that online platforms and software packages for data collection allow more complex designs to be built, with many tools available to researchers (including skip questions, blocks, scales and timers) that simplify the data collection process overall (Nayak & Narayan, 2019). This advantage was particularly beneficial when planning the study design and questionnaire development in this research, as display logic and skip questions were required due to the experimental manipulation and randomisation procedures (Appendix B).

However, online surveys are not without disadvantages, such as the lack of control researchers have at the time of data collection (Ball, 2019) and that participants may be less likely to respond due to high competition and frequent survey invites in a more digitalised world (Lehdonvirta et al., 2021). Furthermore, online surveys can also be disadvantageous for long studies involving many questions and conditions, as the drop-off rates in such cases are likely to increase due to fatigue and lack of engagement (Menon & Muraleedharan, 2020; Nayak & Narayan, 2019). To reflect this, the aim was to design a relatively short survey experiment as the recommended length of online surveys is no longer than 13 min, and anything beyond that can affect response quality and increase drop-off rates (Menon & Muraleedharan, 2020; Revilla & Höhne, 2020).

Furthermore, an online survey was seen as the appropriate mode of data collection, particularly in terms of organising, transferring, maintaining, and analysing the data. Creating a survey experiment involves randomisation procedures, and it would have been more challenging to collect data using a pen and paper questionnaire on campus, let alone transforming this data for computer-based analysis afterwards.

Once the data collection mode was identified, several online tools for data collection were evaluated, including SurveyMonkey, SurveyGizmo, Jisc Online Surveys, QuestionPro, and 1KA; however, none of these tools offered advanced randomisation features. Therefore, after a thorough review of various online survey software programs for data collection, the factorial survey experiment was prepared using Qualtrics XM (https://www.qualtrics.com), a customised tool that dominates academic research and is commonly used for administering more complex survey experiments. TU Dublin did not have a license for Qualtrics and there were no institutional funds to facilitate this,

therefore the author used personal funds to collect data with Qualtrics because the software platform includes advanced randomisation, customised builds for more complex experimental designs, direct export of data to SPSS, variable coding, a range of different scales, descriptive statistics reports, confidentiality, and customer support.

In terms of security and data collection, the survey was created using the feature "Prevent Multiple Submissions" in Qualtrics XM that places a cookie on individual browsers. If participants attempt to complete the survey on the same browser, they will be flagged as duplicate responses by Qualtrics. The feature "survey retakes" was disabled, and a response ID identifying each case was also available; thus the responses will have been flagged as spam if another survey attempt from the same IP address has been made. Finally, bot detection was enabled (Q_ReCaptchaScore), which rates the probability that the survey responses are submitted by humans (Qualtrics XM, 2022).

5.5.2 Cognitive Interviews

There can sometimes be a gap between researchers' intentions and the participants' perceptions of the purpose of some survey questions and their meaning. Researchers, scientists, and practitioners have dedicated a great deal of effort to identify effective methods and techniques to address this challenge, and cognitive interviewing is commonly used to pre-test questionnaires (Beatty & Willis, 2007). Cognitive interviewing involves administering a draft of the questionnaire to participants of the same sample of interest while at the same time collecting additional verbal information about the survey, which in turn is used to help identify any phraseology issues and ensure the survey questions convey the intended meaning (Beatty & Willis, 2007).

A qualitative phase involving 10 cognitive interviews which preceded the survey experiment launch was used in this research. While it is challenging to determine the most appropriate sample size in order to identify issues with survey questions (Scott et al., 2021), for large-scale national survey panels, current practice recommendations suggest that cognitive interviews be conducted in rounds ranging between 5 and 15 (Willis, 2005). In practice, time and resource constraints determine the number of cognitive interviews that can be conducted (Beatty & Willis, 2007) and researchers found a positive relationship between increased sample size and problem detection (Blair & Conrad, 2011). Having a demographic variety in cognitive interviews have also been recommended (Beatty & Willis, 2007); thus the number of participants was selected according to the quota sampling method on gender, and it was decided that five men and five women would have to be recruited for this purpose.

The individual cognitive interviews were held with final year students from TU Dublin to trial the questionnaire between April and May 2020 and evaluate any issues with the survey questions. Participants were recruited through email and assistance was obtained from lecturing staff who have access to current students. Due to the COVID-19 restrictions in place at the time of the pretesting phase, all interviews were conducted online rather than face-to-face on campus. Hence, TU Dublin students were sent a private email by the researcher with a link to the survey and an invitation to participate in a cognitive interview on completion. The students were required to complete the survey on their own and comment on the questions as part of the interview as the aim was to explore the participants' attention and comprehension of all questions, the design of the questionnaire, the suitability of the experimental stimuli selected, the time required to complete the survey, and the software used for data collection.

However, using students in cognitive interviews has limitations. For example, individuals with higher educational attainment are less likely to detect serious issues with the survey questions compared to individuals with lower education, and as such, it is believed that those with lower educational attainment should be prioritised (Scott et al., 2021). As suggested by researchers "cognitive failures in the drafts survey questions are most efficiently and comprehensively identified by interviewing participants who are most likely to struggle with the material" (Scott et al., 2021, p. 993). This limitation can lead to potential undetected problems with survey questions that could have otherwise been captured with a different pool of respondents (Ryan et al., 2012). To ensure relevance in the target respondent population (Scott et al., 2021; Willis & Artino, 2013) it was more appropriate to pre-test the survey with students from TU Dublin while recognising limitations. Though limited by sample representativeness, the intention was to have two well-matched samples (See Section 5.6. for more details on sample and recruitment).

Beatty and Willis (2007) discuss the use of follow-up questions (probes) as part of the cognitive interviewing process, which involves asking participants to comment on problematic questions and describe any difficulties encountered when answering the questionnaire (Beatty & Willis, 2007). Participants were thus asked to elaborate on the meaning of the questions, the reasons for their answers, what the questions meant to them, the wording of the questions, what they thought of the response categories, and how sure they were in selecting the answers to the survey questions. The length of all cognitive interviews was between 40 and 60 min long. At the final stage of the interview, the participants were asked to state the purpose of the survey, and their

responses to this question indicated that the real purpose of the study was not revealed nor that the study design was experimental in nature.

The participants took between 5 to 7 min to complete the survey, and no interviewee believed it was too long or time-consuming. As mentioned earlier, the recommended length of web surveys is 10 to 15 min (Revilla & Höhne, 2020). However, as the goal of cognitive interviews is to improve the design of the survey, some of the suggestions provided by the participants resulted in minor amendments to some of the final survey questions. Most of these changes were related to the wording format of individual items and helped to improve the clarity of the questions. Due to these changes, the data obtained from the participants in the cognitive interviews were only used to amend the questions and were not included in the main analysis (see Table 5.5).

Table 5.5

Cognitive Interviews –Amendments to Survey Questions

Draft survey items	**Amended items after cognitive interviews**
Alcohol consumption (AUDIT-C) Thinking about your drinking behaviour prior to COVID-19, how often, on average, do you have a drink containing alcohol?	- -
	-
Never Monthly or less 2-4 times per month 2-4 times per week 4+ times per week	- - - - -
Thinking about your drinking behaviour prior to COVID-19, how many units of alcohol do you have on a typical day?	*"on a typical day"* was replaced with a *"typical drinking occasion."*
1-2	-
3-4	-
5-6	-
7-9	-
10 or more	-
Thinking about your drinking behaviour prior to COVID-19, how often do you have 6 or more units on one occasion? Never Less than monthly Monthly Weekly Daily or almost daily	*"on one occasion"* was replaced with a *"typical drinking occasion"* for consistency with the previous questions. - - - - -
Negative emotions Thinking about the advertisement you just viewed, how did you feel while viewing it? Angry, Scared, Worried	- -
Recall What can you remember of the ad you just saw?	Difficult open-ended question with many possible (broad) response options. Based on the cognitive interviews, health warning recall was captured better by *"Please try to recall what the warning label read"* statement instead of *"what can you remember of the ad…."*
Believability How believable did you find the health warning(s) on the ad you just saw? How convincing did you find the health warnings on the ad you just saw?	The text *"the ad you just saw"* at the end of each statement was removed as it was considered unnecessary wording.
Knowledge of the health effects of alcohol Alcohol can cause mental health problems. Alcohol is addictive. Drinking alcohol when pregnant harms the unborn baby. Alcohol can cause cancer. Alcohol can cause liver disease(s).	- - - - -

	-
Perceived personal risks of alcohol use Alcohol consumption has damaged my health. I am worried that drinking will damage my health in the future. Drinking alcohol has lowered my quality of life. I am worried that drinking alcohol may lower my quality of life in the future.	 - - - -
Self-efficacy Overall, how confident are you that you can reduce your drinking altogether right now? (Not all confident- Very confident). Cutting down on the number of alcohol units that you drink in the next week would be: (Not all easy – Very easy).	The word *"altogether"* implies that one should stop drinking completely. The combination of *"reduce"* and *"altogether"* was found to be confusing, *"reduce drinking"* alone was more appropriate, and the word *"altogether"* was removed.
Demographic questions What is your age? What is your gender? What is your nationality?	- - -
Post-discussion Questions about the health warning designs and alcohol ads	

5.5.3 Measurement Items

Overview.The use of accurate and reliable measurement scales is particularly important in quantitative studies, as the validity and reliability of the research findings depend on the quality of the measurement instruments (Boateng et al., 2018). Cronbach's α scores are reported in Chapter 6 as each statistical model has a different number of cases due to the study design involving skip logic questions and randomisation (see Chapter 6 for details). As discussed in the previous section, the measurement items were pre-tested with an initial qualitative phase, the flow of the survey questions can be found in Appendix B, and the final study as completed by the participants via Qualtrics is available in Appendix C.

It is noted that mean scores (rather than sum scores) were selected as the unit for analysis. From a statistical perspective, the results would not differ based on whether

the sum or mean was used. “With complete data, sums and means of item responses clearly are equivalent estimates, with sum scores confounding the number of items with the mean item responses. Mean scores have the advantage of being in the measurement units of the items. With missing data, sum scores confate missingness with 0 (unless complex corrections are used), whereas mean scores implicitly impute a person’s mean item response for missing data” (Widaman & Revelle, 2022, p.1). A practical justification for using average instead of sum scores is the number of questions/items. In the presence of seven items, if sum scores are used, it needs to be ensured that when comparing the sums participants responded to the same number of questions/items, as a person who answers them all will have a higher chance to get a higher score compared to a person who left one or more items blank. With average—other factors being equal— this is not an issue. If the significance (*p*-value) is the same, the mean score provides a better way to compare the scales because the reader can interpret whether they fall within the low or high theoretical limit.

AUDIT-C (Questions 1, 2, and 3). Alcohol use refers to the levels of alcohol consumption and can be measured using several approaches, including alcohol consumption in response to specific beverage types, how often the product type is consumed (Gunter et al., 2009; Mazis et al., 1991; Real & Rimal, 2007), and lifetime alcohol use (Unger et al., 2003). However, the current study concerned adults and not adolescents, and as such, these measures were not considered useful. The Alcohol Use Disorders Identification Test (AUDIT) is a measure of alcohol consumption that was developed by the World Health Organization and consists of 10 items that measure self-reported alcohol use, harmful drinking, and dependence (World Health Organization, 2001). A simplified version of the questionnaire, AUDIT-C, consists of three items to

measure alcohol use: the frequency of consumption, the number of units, and the frequency of binge drinking (Davoren et al., 2015, 2016). The AUDIT-C has been extensively validated in alcohol marketing and drinking behaviour research (Alhabash et al., 2016; Bosque-Prous et al., 2014; Burns et al., 2016; Carrotte et al., 2016; Cousins et al., 2016; Critchlow et al., 2019; Davoren et al., 2015, 2016; Erevik et al., 2018; Loose & Acier, 2017; Noel et al., 2018, 2020; Ridout et al., 2012; Wicki et al., 2010), and research on alcohol product health warnings (Coomber et al., 2018; Critchlow et al., 2020; Gold et al., 2020; Jones et al., 2022; Sillero-Rejon et al., 2018; Zahra et al., 2015).

While AUDIT-C has some limitations associated with the accuracy of self-reported alcohol consumption (e.g., units estimating; Delaney et al., 2014), this research is about the impact of health warning designs in alcohol ads and does not focus on harmful drinking or how health warning designs affect consumption patterns. Consistent with studies from the UK (Critchlow et al., 2019, 2020) and Ireland (Cousins et al., 2016), the use of the AUDIT-C questionnaire provides a useful means for classifying participants as “lower-risk” drinkers or “higher-risk” drinkers by summing the items with scores of 0-5 classified as low-risk drinkers and a score of > 5 classified as high-risk drinkers. The original AUDIT-C questions are phrased as:

Scoring System	0	1	2	3	4
1. How often do you have a drink containing alcohol?	Never	Monthly or less	2-4 times per month	2-4 times per week	4+ times per week
2. How many units of alcohol do you drink on a typical day when you are	1-2	3-4	5-6	7-9	10+

	drinking?					
3.	How often do you have six or more drinks on one occasion?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily

Note. AUDIT-C; Babor et al., (2001) p 17.

Given that the data collection stage occurred in May 2020 during the initial COVID-19 outbreak, and based on feedback from the cognitive interviews, it was especially important to signify that the study aimed to collect data on the participants' alcohol consumption before the COVID-19 pandemic in Ireland. The questions were thus modified as presented below:

- thinking about your drinking behaviour prior to the COVID-19 lockdown, how often, on average, do you have a drink containing alcohol? (never, monthly or less, 2-4 times per month, 2-4 times per week, 4+ times per week)

Respondents were categorised as "never drinkers" if they answered *"never"* to the first question and were therefore not asked Questions 2 and 3 relating to alcohol consumption.

- thinking about your drinking behaviour prior to the COVID-19 lockdown, how many units of alcohol do you have on a typical drinking occasion? Response options: (1-2, 3-4, 5-6, 7-9, 10+)

No amendments were made to the response categories of Question 2 referring to the quantity of drinking, but some changes were made to the wording of this question. Instead of asking how many units of alcohol they have *on a typical day*, participants were asked how many units they consume on *a typical drinking occasion*. These questions have the same meaning, but as they were subjected to cognitive interviewing

(Section 5.5.2), the wording on *a typical drinking occasion* made more sense for the participants.

- thinking about your drinking behaviour prior to the COVID-19 lockdown, how often do you have 6 or more drinks on a typical drinking occasion? (never, less than monthly, monthly, weekly, daily or almost daily)

Question 3 measured the frequency of binge drinking and had the same response categories as Question 1. However, to maintain consistency with Question 2, minor wording amendments were necessary where participants were asked how often they have 6 or more drinks on a "*typical drinking occasion"* rather than "*on one occasion*." Participants were shown an image (see Figure 5.3) illustrating the definition of 1 unit of alcohol to help them answer Questions 2 and 3.

Figure 5.3

Alcohol Unit Definition

It should be noted that this study deviates from recommended practice, particularly in how the aforementioned questions were formulated. Although the AUDIT-C scale was originally developed for use as a diagnostic tool in clinical settings to identify problematic drinking and whether interventions are required (O'Dwyer et al., 2021), the author did not use the scale in line with major surveys in Ireland (e.g., Mongan et al., 2021; O'Dwyer et al., 2019; O'Shea et al., 2017). As a result, the AUDIT-C was only used as a blunt instrument to classify people into "current drinkers" and "never drinkers" rather than based on levels of alcohol use as initially intended. This issue has also been acknowledged in Chapter 7, Section 7.8.

Distracting Questions 4-5. The survey includes another two health-related questions (see Appendix C for details), as it has been suggested that participants should not have an accurate understanding of the real purpose of experimental research studies (Geuens & De Pelsmacker, 2017). The purpose of masking questions is to hide the true purpose of the study (Geuens & De Pelsmacker, 2017), thus the subject matter (health-related vs. other related constructs) of the masking questions chosen is arbitrary so long as they serve their intended purpose which is to conceal the researcher's objectives. As the aim of the study was to examine the efficacy of health warnings, health-related questions were deemed more relevant for inclusion compared to questions not related to health. Furthermore, the theme of the survey was subjected to cognitive interviewing with the question "In your own words, please tell me what is this study all about"

- According to Interviewee (1) one "the study was about alcohol interpretations and how people see alcohol and they feel about it". Similarly, Interviewee (2) said "it was gradually leading you to health and how we perceive our health"

- Interviewees (3) and (4) believed the purpose of the study was about drinking behaviour and health and Interviewee (5) said "I would have taken it as a study of the effects of alcohol on people's health and well-being I suppose."

Question 4 reflects individual health awareness (consciousness) developed by Gould et. al. (1998). MANOVA was run with and without health consciousness as a covariate and there were no differences in results. Question 5 focuses on family susceptibility to health risks; however, these were not included in the analysis because family susceptibility to risks was created by the author, and as such, these questions were not validated in previous research.

Negative Emotions (Question 6). The next measurement decision was in choosing a negative emotions scale. In the literature, those who have measured negative emotions have focused on fear as a stand-alone measure or negative affect overall, with and without fear (Noar et al., 2020). Measures of negative emotions are most commonly assessed by asking questions about feelings towards the health warnings, including *"How much did the warning on your cigarette packs make you feel…"* (Francis et al., 2017). The items and response options vary across the health warnings literature, although the most common negative feelings examined are *fear, worry, anxiety, disgust, sadness,* and *anger* (Cho et al., 2018; Francis et al., 2017; Morgenstern et al., 2021; Noar et al., 2020; Noar, Hall, et al., 2016; Pechey et al., 2020).

From the literature review it is evident that no previous research examining negative emotions in the context of alcohol advertising could be identified and that measuring the possible effects of negative emotions is important, as some of the tested health warning

designs are likely to evoke negative emotional reactions, and negative emotions have been identified as an important indirect pathway of influence (Noar et al., 2020). For this reason, negative emotions were measured similarly to previous studies on product health warnings using a slightly different approach, considering that the context is advertising, not products. For instance, Popova et al. (2017) measured positive and negative emotions to health warnings displayed on tobacco ads using the question *"Think about the ad you just viewed. How much did the ad make you feel worried, angry, sad?"* (Popova et al., 2017).

In this research, it was deemed more relevant to follow the approach utilised by Popova et al. (2017), as studies measuring negative emotions for product warnings purposively draw attention to the warnings. The research participants in this thesis were thus asked, *"Thinking about the advertisement you just viewed, how did you feel while viewing it?"* with three response items *"worried," "angry,"* and *"scared."* Rather than using a 9-point scale (Popova et al., 2017), the research participants rated each response item on a 5-point scale based on the PANAS scale (Watson et al., 1988), where 1 = *(not at all),* 2 = *(a little),* 3 = *(moderately),* 4 = *(quite a bit),* and 5 = *(a lot).*

PANAS developed by Watson et al. (1988) is a scale that has been used with health warnings in tobacco ads (Niederdeppe et al., 2019), and many of the word items have been assessed in the literature on product health warnings (Noar, Hall et al., 2016; Francis et al., 2017). Given that PANAS (Watson et al.,1988) is a well-known scale measuring emotions, using a 7-point response alternatives to this question was not considered appropriate, as this reflects the original scale developed by Watson and Tellegen who devised individual labels for each of these five points (these were: "Not at

all", "A little", "Moderately," "Quite a bit", "A lot"). An additional two points added to the scale would deviate from the original scale too significantly as new labels would need to be created. The mean score was utilised to obtain a total negative emotions scale based on the three items.

Health Warnings Recall (Question 7). There are two types of recall often measured as part of evaluations on health warnings (Francis et al., 2017; Noar et al., 2017). Unprompted recall asks participants to remember anything in the ad or what the warning in the ad said without being prompted with response options (Francis et al., 2017). In the domain of product health warnings (Hobin et al., 2020; Noar, Hall, et al., 2016) and advertising health warnings (Mays et al., 2016, 2019; Stark et al., 2008; Strasser et al., 2012; Truitt et al., 2002; Wackowski et al., 2019) unprompted recall takes the form of a free-text, open-ended question. On the other hand, prompted recall implies that participants are typically prompted with response options (Miller et al., 2011) thus reminding them of the health warning messages (Truitt et al., 2002). One limitation is that unprompted recall increases the time required for survey completion, leads to higher drop-off rates, is more difficult for the respondents to answer the question and for researchers to interpret and analyse the data (Truitt et al., 2002). Whereas for prompted recall, the likelihood to correctly recall the health warnings is 50% higher (Truitt et al., 2002). Therefore, the main decision when utilising this measure relates to the type of recall to be used, although both measures are sometimes used together (Hobin et al., 2020; Miller et al., 2011; Truitt et al., 2002).

By far, a widely used method of measuring recall in advertising health warnings research is the unprompted method (Mays et al., 2019; Strasser et al., 2012; Wackowski

et al., 2019), and in light of the above, it was deemed reasonable to use unprompted recall in this study. Hence, participants were asked the single question, *"Based on the ad you just viewed, please try to recall what the warning label read."*(King et al., 2020; Leos-Toro et al., 2019; Mays et al., 2019; Strasser et al., 2012).

Health warnings recall was coded using 2 = "recalled the warning concept," 1 = "recalled something," and 0 = "recalled nothing (e.g., King et al., 2020; Leos-Toro et al., 2019; Mays et al., 2019; Strasser et al., 2012). Recalled the warning concept was defined as a response that contained three or more references to fatal cancers, such as bowel, breast, liver, and mouth cancer, for the alcohol ads with single-text and image-and-text health warnings, and a response that included three or more health warning mentions related to a) pregnancy, b) mental health, c) cancer, and d) HSE website link www.askaboutalcohol.ie was defined as correct recall for the alcohol ads with multiple-text health warnings. Recalled something was measured for responses with less than three cancer diseases in relation to the single-warning and less than three correct warning mentions for the multiple-text health warning. Table 5.6 provides examples of what was coded as recalled the warning concept, recalled something and recalled nothing.

Table 5.6

A Breakdown of Major Recall Responses

	Single Warnings	**Multiple Warnings**
Correct Recall	• Alcohol causes cancel of the liver, bowel, breast, • Alcohol can cause cancer of the throat, lyax, viver and breast • alcohol can cause cancer of the oesophagus, liver, larnyx, bowel, mouth etc. • drinking causes throat, larynx, esophagus, liver, breast cancer • Alcohol can cause cancer in the mouth, larynx cancer, pharynx cancer, oesophagus cancer, bowl cancer and breast cancer • Alcohol can cause cancer of the mouth pharynx larynx oesophagus breast liver pancreas and bowel	• Alcohol may cause various cancers (mouth, breast, liver, ect), alcohol may cause mental health issues, drinking when pregnant is harmful to the baby, visit askaboutalcohol.com for more info • Alcohol can harm your baby. Alcohol can cause mental health problems. And it can also cause a variety of cancers. • Alcohol causes cancer damages your mental health and your unborn baby • Alcohol can cause cancer & mental illness. Can be harmful for pregnant women
Recalled Something	• Alcohol causes various cancers • Causes various types of cancer linked to mouth and throat • Alcohol can cause cancer in a number of organs. • Alcohol can cause cancer • Alcohol can cause cancer of the mouth, larynx • Alcohol causes illnesses including cancer of the oesophagus and breast • Alcohol can cause mouth cancer • Cancer of a number of areas, including breast cancer.	• Alcohol causes **mental health** problems, drinking while **pregnant harms** the baby, alcohol causes liver problems, more info at.. • Alcohol can harm your health- harm your **unborn baby**-harm your **mental health** • Alcohol and health, pregnancy issues • Drinking alcohol may cause **cancer mental health** problems liver diseases • Alcohol can lead to a wide range **of cancers, including bowel, breast, larnyx, liver, pancreas. It can also lead to mental health problems.** • Alcohol is harmful to unborn baby's • Alcohol can cause cancer • Mental health problems caused by alcohol
Recalled Nothing	• A warning about the effects of excessive alcohol consumption. • I don't/can't remember" "health warnings" " I couldn't/didn't read it" "alcohol kills" " I'm not sure" "damaging health" • "I read that alcohol can cause all sorts of problems." • "visit drinkaware.ie"	**Same**

Given the experiment was a self-administered survey where the participants were not in the presence of the researcher, it was impossible to legitimately isolate those who did not take the task seriously versus those who were engaged with the study based on their recall responses. A qualitative analysis of the text responses did not highlight any potentially dubious responses that did not relate to the task at hand. For instance, all responses which were coded as "no recall" arguably related to the study itself, examples of which are: "Cannot recall", "I don't remember," and "visit drinkaware.ie". Thus, it is not viable to identify whether those who responded with answers such as these have not taken the task seriously or have attempted to answer but legitimately could not recall the ad warnings. Furthermore, the three categories for recall were identified based on previous research on advertising health warnings (e.g., Mays et al., 2020; King et al., 2020; Strasser et al., 2012). These were "no recall," "recalled something from the warning," and "recalled the health warning." The above recall examples were thus coded as "no recall." While Critchlow et al. (2020) refined codes to account for non-sensical information in their cross-sectional survey on product health warnings and excluded nonsensical responses, in the current data, arguably, a nonsensical response could have only been "drink-responsibly" or "drink awareness." However, such responses were very few in the dataset, and many of the participants assigned to the no-recall category indicated that they simply did not remember or did not recall what the health warning(s) read.

Believability (Questions 8 and 9). The believability of health warnings was first validated as a measurement for health warnings in cigarette advertising by Beltramini (1998; Atkin & Beltramini, 2007), with a scale measuring the perceived believability of tobacco advertisements, including keywords such as believability, credibility,

conclusiveness, trustfulness, convenience, honesty, likeliness, and authenticity. Based on Beltramini's work, the believability of health warnings has often been measured with one or two questions related to how *believable*, *credible*, or *truthful* tobacco health warnings to the respondents (Francis et al., 2017, 2019; Maynard, Gove, et al., 2018). As previous studies of health warnings on alcohol products have utilised the same approach to measure the *believability* of health warnings (Andrews & Netemeyer, 1996; Miller et al., 2016; Pettigrew et al., 2014, 2016; Winstock et al., 2020), this study followed suit by measuring the *believability* of alcohol advertising health warnings based on how *believable* and *convincing* are various alcohol cancer warning statements from 1= *not at all believable/convincing* to *5= very believable/convincing*. (Pettigrew et al., 2014, 2016).

Given that Pettigrew's et al's (2014, 2016) has been used with cancer warnings in the health warnings literature this scale was chosen. The scale involves two questions, which increases the reliability of the scale relative to the single-item scales reported in previous research on cigarette warnings (Francis et al., 2017). However, Pettigrew's et al's (2014, 2016) believability scale consists of two response items on a 5-point scale, it was decided that if a 5-point scale had been utilised it is possible that the scale would lack variance and may undermine the statistical tests used in the study. Thus, the participants' responses to both questions were rated on a 7-point scale (1 = *not at all convincing* to 7 = *very convincing*, and 1 = *not at all believable* to 7 = *very believable*). Furthermore, a 7-point scale allows for finer discimination between responses which increases the validity of the results and is advantageous as using more scale points reduces the chances of getting highly skewed data (Dawes, 2008).

Knowledge of the Health Effects of Alcohol (Question 10). Studies have measured knowledge of health effects by asking questions about health conditions related to tobacco (Francis et al., 2017) and alcohol consumption (e. As part of a cross-country longitudinal project, the International Tobacco Control (ITC) survey offers a validated measure of *knowledge of health risks*. The ITC Project was developed to assess different tobacco-related behaviours, including knowledge of the health effects of tobacco consumption, risk beliefs, marketing and other tobacco policy interventions (International Tobacco Control Project [ITC], 2012) and have been used in numerous studies with representative samples across countries (Borland et al., 2009; Brown et al., 2009; Chung-Hall et al., 2020; Gravely et al., 2016; Hammond et al., 2006; Li et al., 2016; Sansone et al., 2012; Yang et al., 2010). Previous studies in alcohol marketing have also incorporated some of the ITC measures in the International Alcohol Control project (IAC), which was created in 2012 with the purpose of evaluating policy interventions (Casswell et al., 2012).

Applying lessons from the tobacco health warnings literature was deemed appropriate, as researchers in the alcohol domain have used a similar measurement to evaluate knowledge of alcohol health effects. The only minor difference between these studies is the selection of response items in terms of health-related diseases. For instance, knowledge of cancer, liver diseases, diabetes, mental health, and pregnancy harms were measured in numerous studies on alcohol product health warnings (Hobin et al., 2020; Jongenelis et al., 2018; Morgenstern et al., 2021; Weerasinghe et al., 2020). Similarly, Weiss (1997) examined alcohol knowledge associated with driving, cancer, general health issues, blood pressure, and drug use, whereas Greenfield et al. (1993) assessed drink-driving, alcohol addiction, and pregnancy harm statements. Finally, MacKinnon

et al. (1995) evaluated seven alcohol knowledge-related questions regarding pregnancy issues due to consumption of alcohol.

As described above, various studies have assessed knowledge of alcohol health effects by examining different alcohol-related diseases using approaches based on the tobacco literature on product health warnings. Therefore, in this study, knowledge of the health effects of alcohol was measured using the scale from the ITC 6 European country W2 survey (2018), which measures knowledge in terms of tobacco-related diseases with the question *"Based on what you know or believe, does smoking cause…?"* It is noteworthy that the ITC survey scale measuring knowledge was validated in studies examining the impact of alcohol product health warnings in Canada (Hobin et al., 2020; Weerasinghe et al., 2020), with both studies measuring knowledge using the question *"Based on what you know and believe can drinking alcohol cause…?"* (Hobin et al., 2020; Weerasinghe et al., 2020). Morgenstern et al. (2021) also employed a similar approach in their experimental study on alcohol product health warnings in Germany. Therefore, it was decided to measure knowledge by asking the participants: *"Based on what you know or believe, how strongly you agree or disagree with each statement?"* with response options:

- alcohol can be addictive
- drinking impairs the ability to operate machinery
- alcohol can cause liver disease(s
- drinking alcohol when pregnant harms the unborn baby
- alcohol can cause cancer of the mouth, pharynx, larynx, oesophagus, liver, pancreas, bowel and breast

- alcohol can cause mental health problems

Participants rated their knowledge based on each statement above using a continuous 7-point scale from 1 = *"strongly disagree"* to 7 = *"strongly agree"*—in line with previous research in the domain of alcohol health warnings (Greenfield et al., 1993; Weiss, 1997). Given that in the literature knowledge has been examined based on health conditions that are shown on the warnings and others that are not (Greenfield et al., 1993; Morgenstern et al., 2021), it was decided to follow the same approach and examine three statements that were shown on the health warnings (these were: pregnancy, mental health, and cancer) and three statements that were absent from the warnings (these were: addiction, liver disease and drink-drive). The knowledge-related statements not included in the warnings were based on previous research, which examined alcohol knowledge associated with drink-drive, liver disease, and alcohol addiction (Al-hamdani & Smith, 2015; Greenfield et al., 1993; Weiss, 1997;Winstock et al., 2020). In Chapter 1 (Section 1.2), it became evident that Ireland is over-represented in liver cirrhosis data (HRB National Drugs Library, 2020) and that out of 6252 suicide cases, 31% were linked to alcohol in 2019, and 5824 individuals were reported as alcohol dependent in 2020 alone (HRB National Drugs Library, 2021). Furthermore, data from the National Study of Youth Mental Health report suggests that many young adults who engage in excessive drinking could develop an addiction to alcohol in the future (Dooley et al., 2019).

Perceived Personal Risks of Alcohol Use (Question 11). From Chapter 4, it is evident that perceived risks of alcohol use have been measured differently across studies (for reviews, see Argo & Main, 2004; Noar et al., 2020). In the tobacco health warnings

literature, perceived risks are measured by asking participants about their thoughts on smoking-related health risks and behaviours (Noar, Hall et al., 2016, 2020). However, it seems that this outcome has been less frequently examined as a variable in research on alcohol product health warnings. For example, previous studies from the United States did not find any significant changes in perceived risks after the US Act on alcohol product labelling was implemented (Scholes-Balog et al., 2012). Other studies have measured the perceived harm associated with the consumption of specific types of alcohol products (Al-hamdani & Smith, 2015; Mazis et al., 1991), the perceptions of the warning labels themselves (Winstock et al., 2020) and risk perceptions of alcohol use (Wigg & Stafford, 2016). More recently, another study measured affective perceived personal risks of alcohol use with questions related to worry about developing cancer as a result of alcohol consumption (Ma, 2021).

As with knowledge, the ITC longitudinal survey offers a validated measure of *perceived risk beliefs*. Hence, based on the validity and reliability of the ITC measures, it was decided to use four items that measure *perceived risks,* with questions referring to the participants' general risk beliefs about their health as a result of tobacco consumption. The questions are: *"To what extent, if at all, has smoking damaged your health?"* and *"How worried are you, if at all, that smoking will damage your health in the future?"* Similarly, Wigg and Stafford (2016) measured the extent to which health warnings increased risk perceptions of consuming alcohol using a scale adapted from studies on tobacco health warnings.

Hence, the current study utilises a similar approach to measure *perceived risks of alcohol use* without explicitly drawing the participants' attention to the health warning

itself. In order to ensure the suitability of these questions in the context of alcohol, the wording was amended, and the questions were presented in the form of statements, including "*Alcohol consumption has damaged my health," "I am worried that drinking will damage my health in the future," "Drinking alcohol has lowered my quality of life,"* and *"I am worried that drinking alcohol may lower my quality of life in the future."*

In addition, it was deemed more appropriate to label this variable as perceived personal risks of alcohol use because these questions asked the research participants to provide a self-reported perceived personal risk evaluation with respect to their health and alcohol consumption. Finally, instead of using categorical response options as in the ITC survey (e.g., yes/no/don't know), *perceived personal risks of alcohol use* were measured in this research by assessing the participants' level of agreement on a 7-point scale (1 = *strongly disagree* to 7 = *strongly agree*). The statements were averaged to obtain each participant's overall score for perceived personal risks of alcohol use.

Self-efficacy (Questions 12 and 13). In Chapter 4, the importance of self-efficacy as a theoretical component in influencing motivation to change risky behaviours was discussed (Rogers, 1983) and is defined as the extent to which individuals can exercise control over their lives and the quality of their health (Bandura, 1978). Research of health warnings on tobacco packaging that examined perceived self-efficacy to quit smoking asked participants about their perceived ability or confidence to quit smoking in a certain timeframe, using questions such as *"I believe I have the ability to quit smoking in the next month"* (Francis et al., 2017); whereas other researchers used similar scales with a longer timeframe of 6 months (Thrasher, Swayampakala, Borland,

et al., 2016). However, using longer timeframes does not fit the aim of experimental studies that focus on the short-term impact of health warnings as a result of one-off exposure, and none of the single-item measurements mentioned above seemed suitable for research on health warnings embedded in alcohol ads, as the current study aimed to measure perceived self-efficacy *to drink less* and not self-efficacy to stop drinking completely.

Studies that have examined the role of self-efficacy in the literature on alcohol health warnings are scarce. Sillero-Rejon et al. (2018) used an adaptation of the scale employed by Harris et al. (2007), who measured the variable self-efficacy to quit smoking. The authors modified Harris et al.'s (2007) scale to suit the context by asking participants, *"Overall, how confident are you that you can stop drinking altogether right now? ("not at all confident" – "completely confident"*) and *"For me, cutting down on the number of alcohol units that I drink in the next week would be ("very difficult – very easy")* with both items measured on a 5-point scale. Sillero-Rejon et al. (2018) changed the wording but kept the same meaning for both questions and reversed the scale for the second item from *"very difficult"* to *"very easy."*

It was decided to adapt the same measure used by Sillero-Rejon et al. for this research using a 7-point scale to maintain consistency with the previous questions; however, some phraseology difficulties were reported during the cognitive interviews with the phrase *"reduce drinking altogether"* (see Table 5.5, Section 5.5.2). Given that the research context is alcohol, the word *altogether* led to confusion, leading to some modifications to the scale. Thus, the wording of the first item was changed to *"Overall, how confident are you that you can reduce your drinking right now?"* which was rated

from 1 = *"not at all confident"* to 7 = *"very confident"* and *"Cutting down on the number of alcohol units that you drink in the next week would be* 1 = *"very difficult"* to 7 = *"very easy."* Total perceived self-efficacy to drink less was calculated as the mean of the two items.

Age, Gender, and Nationality (Questions 14, 15 and 16). The final questions were focused on demographic characteristics and used to gather some general information about thetarget sample. *Age* was included as an open-ended question, where participants had to type in a numerical value; it was deemed more suitable for statistical analysis if the variable was presented in the form of an open-ended question and re-coded into a categorical variable for further analysis should this be necessary. A sensibility check was conducted on age, where case processing summary on age was reviewed for logically implausible answers. The settings in Qualtrics did not allow for logically implausible answers, and if a response of 150 or 14 were made, then the participant would not have been able to progress in the survey. *Gender* was included as a nominal variable with four response options, namely *"male," "female," "prefer not to say," and "other: Please specify."* Information on *nationality* was obtained using the question *"What is your nationality?"* and the two categories were: *"Irish citizen"* and "*non-Irish citizen."*Capturing nationality with two response options was considered appropropriate as the question was added purely for descriptive purposes, e.g., sample characteristics. The aim was to capture the % of Irish citizens vs. Non-Irish citizens and not to compare nationality in terms of drinking patterns or health warnings efficacy.

5.5.4 Covariates Selection

While covariates used in research on health warnings and alcohol policy vary across studies, one common characteristic between them is the emphasis placed on gender, age, and drinking status (e.g., Dekker et al., 2020; Hassan & Shiu, 2018; Noel & Lakhan, 2021; Pettigrew et al., 2016). Furthermore, it has been argued that further research on gender, age, and risk status is needed (Hassan & Shiu, 2018) and the focus of research to date on alcohol health warnings has been on these variables. Other researchers investigated warnings on cigarette advertising, including age, gender, and smoking status as covariates (Niederdeppe et al., 2019). Hence, the covariates selected in this research were those consistently used in a high number of previous studies.

While adding more covariates (e.g., social grade, education) may have benefited the study, not including these variables was not considered a significant limitation with a convenience sample from TU Dublin. That said, education and social grade would have added more value with a different sample (e.g., Gold et al., 2021) and the implication for the study is that the sample of this research consists of more educated and health literate individuals compared to non-university samples. For example, a recent study measured knowledge of lower-risk drinking guidelines, with findings suggesting that those with a higher social grade and education level responded more accurately than those with a lower social grade and education (Gold et al., 2021). Therefore, the results of the current study need to be considered in the context of the convenience sampling method, thus reducing the potential to generalise beyond the participants in the study sample (see Chapter 7, Section 7.5).

5.6 Sample and Recruitment

Probability sampling allows researchers to make generalisations about social phenomena to other population groups and is most commonly associated with quantitative research (Ragab & Arisha, 2018). For example, many research studies in the literature on health warnings have used probability sampling and produced findings that could be generalised due to the use of international and representative samples (e.g., Gold et al., 2020; Noar et al., 2016, 2017; Winstock et al., 2020). Furthermore, some researchers typically discuss the use of non-probability sampling with a sample selected by convenience as a limitation (Peterson & Merunka, 2014; Zhu et al., 2015), whereas others argue that generalisations are not intended when the goal is to test theoretical constructs (Calder & Tybout, 1999). Moreover, generalisations cannot be guaranteed, even if a probability sampling technique is used (Geuens & De Pelsmacker, 2017), and a convenience sample can be appropriate as long as the selected sample is linked to the research design and objectives and can address the research question (Calder et al., 1981).

Some researchers have compared the generalisability of survey experiments using convenience samples against population-based samples, and they argue that survey experiments relying on convenience samples do not necessarily lead to smaller or false effect sizes and are thus commonly utilised in the social sciences (Mullinix et al., 2015). The authors argue that survey experiments using convenience samples are as likely to determine causal effects as population-based samples and can generate findings that are identical to experiments using representative samples (Mullinix et al., 2015).

Athough there are some concerns on the use of convenience samples in terms of generalisability and also that the sample may be demographically different to a random sample of the population, this is not a major concern here as many experimental studies using convenience samples replicate the results of studies from "gold standard" probability samples (Coppock et al, 2018; Krupnikov et al., 2021). Given that the same results are found in convenience vs. probability sampling techniques, self-selection bias, non-response bias and data quality issues were not a worry.

Other alternatives such as snowball sampling were discounted as a recruitment method because snowball is a sampling strategy designed to collect data from participants in hidden populations or niche subject matters (Baltar & Brunet, 2012), which is not applicable here. The author considered and employed an appropriate target sample designed to balance reasonable time and cost constraints with an appropriate level of rigour for a thesis. In particular, convenience sampling of university students was necessitated, which refers to selecting participants based on convenience. Given the widespread use of college email system by staff and students, collecting data from TU Dublin was considered the most suitable way for data collection, with zero budget and within a short time frame. Convenience samples, including university students, have been commonly utilised in previous studies of health warnings on alcohol products (Al-hamdani & Smith, 2015; Annunziata et al., 2017; Droulers et al., 2017; Glock et al., 2013; Hall et al., 2020; Maynard, Blackwell, et al., 2018; Morgenstern et al., 2021; Sillero-Rejon et al., 2018; Vallance et al., 2018; Wackowski et al., 2019; Zahra et al., 2015) and advertising (for a review, see Geuens & De Pelsmacker, 2017). Similarly, university staff have been used in social science survey experiments (Mullinix et al., 2015), and much work, especially on alcohol, has been done on college student samples

(Davoren et al., 2015; de Bruijn et al., 2016; Erevik et al., 2018; Farrell & Gordon, 2012; Henehan et al., 2020; Henriksen et al., 2008; Hoffman et al., 2014; McAleer et al., 2021; Ridout et al., 2012).

5.6.1 Sample Size

The general goal before conducting the survey experiement was to determine an appropriate sample size to achieve statistical power based on recommendations in the literature (Martin, 2008). The author had a rough goal to recruit approximately between 50 and 100 participants per experimental group, in line with recommendations regarding sample size from the literature (Geuens & De Pelsmacker, 2017). A small number of participants per experimental condition can lead to lower statistical power and type II errors which can negatively affect the statistical analysis (Geuens & De Pelsmacker, 2017). A power calculation was also conducted to verify this suggestion, with results indicating that a total sample size of 380 was required for the current study (see Appendix H for a visual representation of the analysis). This was not surprising given that a factorial experimental study with 12 experimental conditions was conducted with a sample of 696 individuals (Diouf & Gallopel-Morvan, 2020). Data collection continued until the minimum required sample was collected (more on this in Chapter 6).

5.6.2 Participant Recruitment and Consent

Before starting data collection, the researcher gained approval to conduct this study from the Research and Ethics Integrity Committee at TU Dublin (Ref. 18238). Participants were recruited from TU Dublin between 27th May and 29th May 2020 through a survey invite sent to the student and staff email list by the Public Affairs office of TU Dublin in the Aungier street (City) Campus, an approach similar to the sampling used by Sillero-Rejon et al. (2018), who recruited staff and students for their experimental study on alcohol product health warnings.

More specifically, one email inviting participants to complete the study was sent to the target population. The total population of students at TU Dublin is 20,000 and the approximate response rates achieved was 5.7%. This is deemed a satisfactory response rate, particularly in light of research by Fosnacht et al. (2017, p. 262) who found "a 5% response rate or even a 75% response rate provides unbiased population estimates under all circumstances, but rather that additional effort to move response rates marginally higher will frequently only shift survey results in trivial ways after one collects a minimum number of responses."

The survey information page highlighted that the data collected would be kept strictly confidential and the results could be reported in an appropriate journal or academic conference. The author's contact details were provided and the option to withdraw from the study was explained. The participants were required to check a box before entering any data to confirm their consent to take part. Only individuals aged 18 or over were eligible to participate and there were no other exclusion criteria.

Participants were informed that the survey was part of a doctoral research study but as this was an experimental investigation, the real purpose of the study was not revealed as fully informed consent contradicts the nature of experimental research (Geuens & De Pelsmacker, 2017). Geuens and De Pelsmacker (2017) argue that researchers should request partially informed consent, consisting of the participants' permission to be included in the study, and telling the research participants that they will be debriefed at the end with additional information about the research study. Similarly, it has been argued that that fully informed consent affects the internal validity of the experimental manipulation, as some respondents may purposively sabotage the study (Kirk, 1995). This practice aligns with previous experimental work and does not posit any risks for the participants. For example, one experimental study on health warnings in tobacco ads aimed to examine the effect of the warnings rather than the ads, thus the participants were told that the research was about their emotions related to the ads and not the warnings (Davis & Burton, 2016). The TU Dublin Ethics Committee approved this procedure on consent and debriefing as part of the ethical clearance obtained for this study (Ref. 18238). See Appendix C for the information sheet, consent form and debrief.

Next, participants were invited to begin with the preexposure survey questions about alcohol consumption and then viewed one of the eight conditions with alcohol ads with or without health warnings in a randomised order. An algorithm within the Qualtrics software completed the randomisation. The "randomiser" feature assigned participants to the control or experimental block. The feature was used to build the survey (see Appendix B), with each participant randomly assigned to one of eight conditions (e.g.,

control vs. experimental). The option “randomly present 1 of the following elements” and select “evenly present elements” was selected as part of the survey design process.

Furthermore, the version of the Qualtrics software did adjust the survey to mobile devices, and offered a feature to preview the survey on different devices; hence the researcher benefited from viewing the survey on different devices. The respondents who participated in the cognitive interviews preferred to fill in the Qualtrics survey on a mobile phone and reported no issues with the visibility of the ad or the survey questions on multiple and scale-point answer options. Notwithstanding the lack of issues reported, in this research the health warnings were displayed in the same size across the experimental conditions, and ratings of the warnings might differ according to the size of the device screen. It is thus possible that the ad visuals appeared larger on a computer, resulting in the images displaying smaller on mobile devices. To clarify, the size of the ad on a mobile device was with the proportions of an alcohol ad on Instagram.

Depending on the allocated experimental condition, the alcohol ads displayed either no health warning (control groups) or one of the three health warnings (multiple-text, single-text, image-and-text). Those who indicated that they never drink alcohol (n =83) were not asked any further questions with respect to their alcohol use (AUDIT-C), their perceived personal risks of alcohol use, and perceived self-efficacy to drink less. Skipping these questions was deemed necessary, as they made sense only for the research participants who have had some experience drinking alcohol.

After viewing the ad stimulus, the participants were then asked post-exposure questions that depended on the allocated experimental condition (see Appendix B). For instance, participants assigned to the treatment conditions (relative to the control groups) were asked to recall what the warning said and to respond to questions about negative emotions and the believability of the health warning. The control group, which did not see any health warnings, was excluded from further analysis. However, all groups (including controls) were asked to respond to questions about perceived personal risks of alcohol use, knowledge of alcohol risks, self-efficacy to drink less, gender, drinking status, and age.

Thereafter, the participants were debriefed, which included information about the real purpose of the study accompanied by a link to Ireland's Health Services (HSE) website for drink awareness, guidedance, and support. TU Dublin Counselling Service contact information and the Student Health Centre details were also included in the survey debrief.

5.6.3 Anonymity and Confidentiality

In order to maximise the survey responses, participants who completed the experiment were not reimbursed but were eligible to enter a prize draw for a chance to win a pair of bluetooth wireless headphones. Prize draws such as tablets, mobile phones or of similar tech-related categories are often used as an incentive in TU Dublin surveys. According to industry analysis, the global market value for Bluetooth Headphones reached 60 billion dollars in 2019 and is expected to grow by 10% between 2020-2029 (Global Market Insights, 2022).

Although the anonymity of some research participants was compromised by asking them to provide a valid email address with respect to the prize draw, there was no other way to offer an incentive without asking for this information.Compensating participants for their participation is common in online survey research (Lehdonvirta et al., 2021; Michaelidou & Dibb, 2006; Singer & Ye, 2013), with findings suggesting an increased response rate for web and panel surveys when various forms of incentives were used (for review, see Singer & Ye, 2013). Once data were collected, one winner was randomly selected based on a unique ID number generated by SPSS, and emails were then deleted from the data set and Qualtrics.

The data were securely stored in an electronic form and protected by a password code in compliance with TU Dublin guidelines under the provisions of the General Data Protection Regulations. Section 13 of the TU Dublin Code of Conduct for Ensuring Excellence in Research Integrity published by the Graduate Research Office outlines that data must be securely stored for at least 7 years after the study has been completed.

5.7 Data Analysis

SPSS IBM Statistics 27 was used for data analysis in this research. Continuous variables were computed and each of them was examined for missing values (for more details, see Chapter 6, Section 6.2.3). There were only two open-ended questions, namely recall and age, whereby recall was analysed qualitatively and then transformed into a multinomial variable. Descriptive statistics were used to summarise the characteristics of the sample according to the allocated experimental condition, the mean and standard deviation values were reported for all continuous outcomes and the

internal validity of each scale was examined using Cronbach's alpha. (see Chapter 6 for details).

The main predictors used to examine the efficacy of health warnings (Research Proposition 1) were recall, believability, negative emotions, perceived risks of alcohol use, self-efficacy to drink less, and knowledge of the health effects of alcohol (for which six health-related statements were measured as dependent variables). Age, gender, and drinking status being examined as covariates and predictors (under Research Proposition 3) were as follows: age (18-25, 26 or over), gender (men, women), and drinking status (never-drinkers vs. current drinkers). The primary analysis was conducted using multinomial logistic regression and multivariate analysis of variance. A multinomial regression was conducted to test for significant associations between health warning designs and recall. The same analytic approach was used to test the moderating role of alcohol ads (with and without social imagery; Research Proposition 2) and demographics. Multivariate and univariate analysis of variance/covariance were then conducted to examine possible interaction and main effects between health warning designs and alcohol ad content as independent variables and believability of health warnings and negative emotions as dependent variables (Model 1). Model 2 tested for interaction and main effects with the same factors as independent variables and self-efficacy to drink less and perceived personal risks of alcohol use as dependent variables. Model 3 examined knowledge of the health effects of alcohol and tested for interaction and main effects between each health warning design as independent variables and six knowledge-related items as dependent variables. Interaction effects between each demographic variable and health warnings were then examined with follow-up MANOVAs (for Model 3).

As it was not possible to simultaneously examine main and interaction effects for all variables of interest, Models 1 and 2 were validated with series of factorial ANOVAs so that interaction effects between each health warning designs and each demographic variable on each outcome can be examined (See Section 5.7.2 for details). This next section of the chapter provides a brief rationale for the statistical tests which were selected for data analysis.

5.7.1 Rationale for Multinomial Regression

Multinomial logistic regression was deemed appropriate to estimate associations between health warnings recall and demographic characteristics, drinking status, health warning designs, and type of alcohol ads. Multinomial regression is suitable for categorical data analysis (Field, 2009) and in the presence of mutually exclusive categories (Petrucci, 2009); thus it is key that the chosen statistical test accounts for nominal variables so that the hypotheses are accurately tested. The dependent variable recall is a multinomial variable with three categories (recalled nothing, recalled something and recalled the full concept) and five categorical predictors (health warning designs, alcohol ad types, age, gender, and drinking status), thus highlighting the rationale for using multinomial logistic regression.

As previously discussed (See Chapter 5, Section 5.5.3 for details), correct recall for single warnings was defined as recall of three or more fatal cancers, and for multiple-text warnings, recall of three or more health messages, namely a cancer warning, a pregnancy warning, a mental health warning, and a link to a website for health information about alcohol consumption. Recalling something from the warning referred

to recalling between one and two fatal cancers (for *single-text warnings)* or between one and two health messages (for *multiple-text warnings*).

5.7.2 Rationale for Univariate and Multivariate Analysis of Variance/Covariance

Evaluating which statistical test is the most appropriate to answer the research questions is important. In this study, multiple hypotheses aimed to identify significant differences between health warning designs in alcohol ads on multiple outcome variables; therefore, adapting multivariate rather than univariate analysis of variance was deemed more appropriate. Multivariate analysis of variance (MANOVA) is defined as an extension of univariate analysis (ANOVA), with the null hypotheses assuming equal variances between groups (Warne, 2014). MANOVA is concerned with the analysis of the mean differences between groups on multiple dependent variables (Field, 2009; Huberty & Morris, 1989) and obtains a multivariate F value (Wilks' λ, Pillai's statistic and Hotelling's trace) with Wilks' λ the most commonly reported statistic across quantitative studies (Pallant, 2020). Adding covariates to the model defines multivariate analysis of covariance (MANCOVA), which is an extension of univariate analysis of covariance (ANCOVA; Ганева, 2016).

Researchers can typically decide between multiple ANOVAs where each dependent variable is examined separately, or a single MANOVA with all dependent variables analysed simultaneously in one model (Huberty & Morris, 1989; Warne, 2014). Although benefits and limitations are associated with each approach, researchers argue that significant differences in MANOVA models may not necessarily translate to significance based on multiple ANOVAs (Huberty & Morris, 1989) and that conducting

multiple ANOVAs on each outcome variable is more likely to increase Type I errors (Warne, 2014).

Deciding whether to use MANOVA or ANOVA further depends on the theoretical and empirical research questions that individual studies seek to address (Huberty & Morris, 1989). For example, MANOVA is more suitable for research studies that are interested in determining (a) whether interaction effects exist between the independent variables and whether there are (b) main effects of all factors on the dependent variables (Pallant, 2020). Given that this study aimed to examine the interaction and main effects between variables based on the hypotheses proposed in Chapter 4, MANOVA was considered superior to ANOVA in terms of analysing significant differences between groups as MANOVA offers superiority in cases of conceptually related (Huberty & Morris, 1989) and moderately correlated variables (Vallejo & Ato, 2012; Warne, 2014). As constructs illustrated in the research propositions guiding this thesis were indeed conceptually interrelated, two-way MANCOVA was deemed more suitable to test for significant differences between health warning designs on multiple conceptually related outcomes. Although using all four dependent variables within one overall model did not change the outcome, it was more appropriate to present the results with two separate models, as the participants assigned to the control groups did not answer questions on negative emotions and the believability of health warnings (see Chapter 6; Figure 6.1). Thus comparisons between the control and experimental groups were not possible, particularly as the control groups were automatically filtered out in the post hoc follow-up calculations.

To address Research Proposition 3, univariate analysis of variance (ANOVA) was used to test for interactions between the health warnings designs and demographics on negative emotions, believability, perceived risks of alcohol use, and self-efficacy to drink less. It is noted that examining four variables effectively becomes unwieldy with main and interaction effects in one multivariate model altogether without violating assumptions. Second, if MANOVA had been utilised to test for moderation, the model would have had fewer degrees of freedom (Field, 2009), and adding more than three factors on multiple outcomes increases the complexity of the model, therefore making it difficult to interpret the results. Third, conducting multiple ANOVAs verified the significant effects found with the MANOVAs, which was considered benefitial. As Research Propositions 2 and 3 specified possible interactions between alcohol ads, demographics, and health warnings, the interaction were assessed after multivariate main effects were examined. The corresponding results, however, are presented with the main models, see Chapter 6, Sections 6.4.2, 6.4.3 and 6.4.4.

5.8 Conclusion

This chapter justifies the use of a quantitative research methodology and demonstrates the need for a randomised survey experiment to research the most impactful health warning designs and test the proposed research propositions in Chapter 4. The chapter described the research process followed to design the factorial between-subjects survey experiment and provided a description of the measurement scales, sample, recruitment procedures, and preparation for data analysis. The key results derived from this thesis are presented in Chapter 6.

CHAPTER 6: RESULTS

Data analysis, data cleaning, multinomial regression, MANOVA, ANOVA,

6.1 Introduction

This chapter builds on previous chapters and presents the results from the between-subject factorial survey experiment that was designed for data collection. It is structured in two main sections: The first begins with an overview of the data cleaning and preparation for analysis, including the participant profile, missing value analysis, attention, and randomisation checks. The second presents the results of the main analysis carried out to examine the research propositions and accompanied hypotheses in Chapter 4. The assumptions associated with the primary statistical tests used for analysing the data are also discussed and chapter conclusions are provided.

6.2. Data Cleaning and Preparation

Data cleaning was conducted as an essential first step before moving forward with further analyses. First, an ID variable was generated for each respondent to track excluded cases, and the variables were then labelled according to the level of measurement. After the removal of influential cases, the internal consistency of the measurement items were assessed using Cronbach's alpha with alpha (α) scores computed with respect to each statistical model. The internal consistency of each scale varied with Cronbach's α ranging from .644 to .819. A score above .7 indicate a very good level of internal consistency and realiability, and levels of between .6 and .7 are considered as satisfactory (Ursachi et al., 2015). Hence, the internal consistency of the

scales used in this research are reliable and footnotes with all α scores are included for each statistical model in Sections 6.4.2, 6.4.3 and 6.4.4.

6.2.1 Data Screening

Figure 6.1. provides a summary of the data screening, the excluded cases, and the overall flow of participants in the experimental study. A total of 1,153 participants were assessed for eligibility. Of these, 61 potential respondents clicked on the survey link but dropped out before starting the survey. Due to the absence of data entries, those 61 cases were deleted, resulting in a sample of 1,092. The next step was to run an attention check deemed necessary to identify whether the respondents attended to the survey questions and ensure that no careless responses or random clicks were recorded. Various methods exist to determine the level of respondent engagement when answering questionnaires, including "attention check" questions with obvious answers (Kung et al., 2018) and measuring the time respondents spent answering those questions (Buchanan & Scofield, 2018). Qualtrics tracks the duration of individual responses, and the time spent answering individual questions for each respondent was thus calculated where case values with less than 4 s per question were considered for exclusion. Survey responses with 4 s per question are seen as extreme with respect to one's ability to read and answer a question. For instance, a recent study found that 6-7 s (on average) is an acceptable value in responding to a survey question (Olson et al., 2020), and the average speed per question in this research was 13 s (M = 13.74 s, SD = 21,46). Only one respondent appeared as an outlier and failed the attention check (e.g., seriousness in answering the questions) and was therefore removed from further analysis, resulting in a total sample of 1,091.

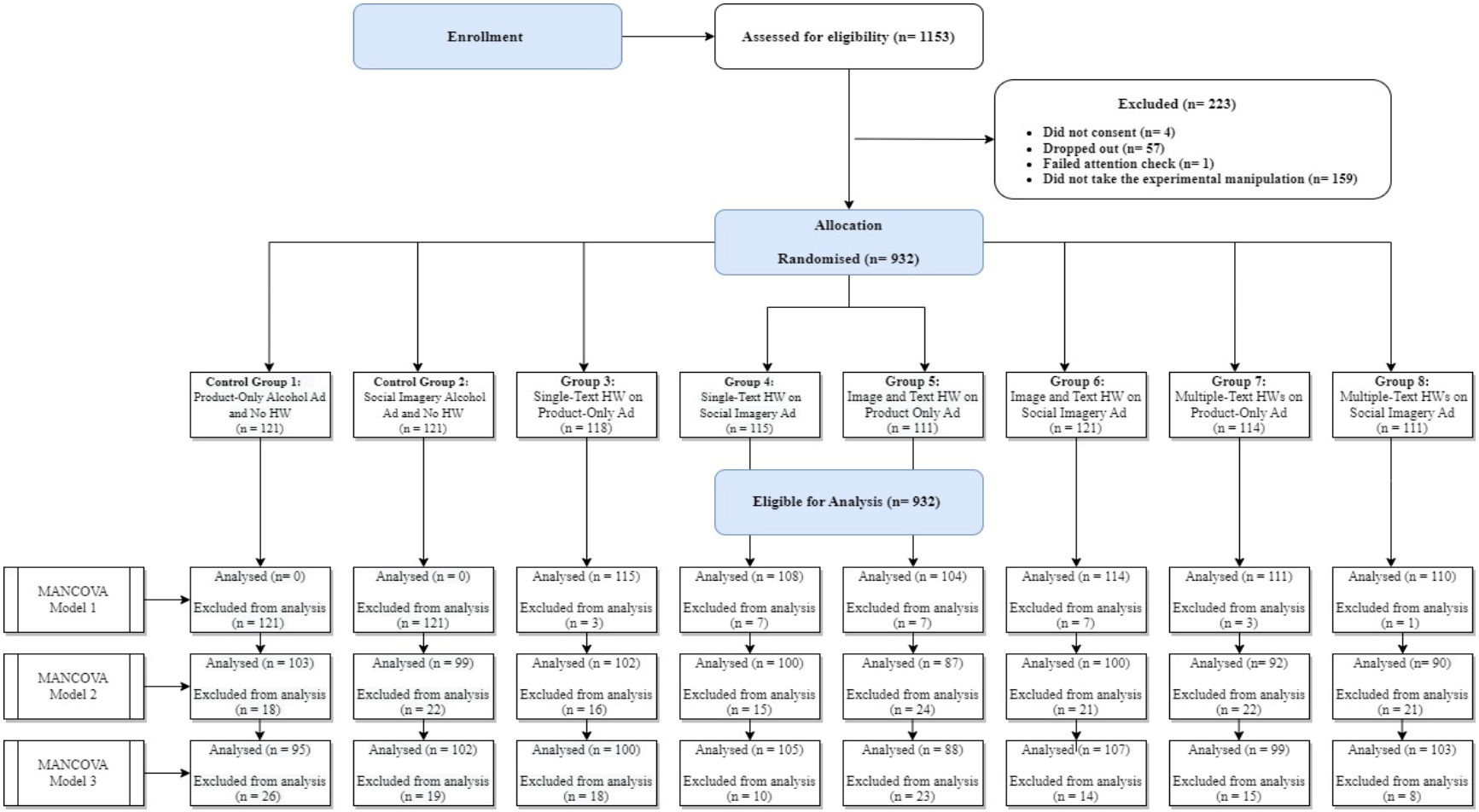
Responses were then checked for straightlining defined as the tendency to provide the same answers to a series of questions from respondents who speed through surveys (Reuning & Plutzer, 2020). The straightlining technique can be used to improve data quality before starting with the main analysis, and these types of responses may impact the means of the items (Geuens & De Pelsmacker, 2017). Only 15 straightliners (1.6%) were found in the data, 10 of which were also identified as multivariate outliers and thus excluded from further analysis. The remaining five straightliners were removed by the author in the analysis stage.

While all questions were mandatory, of the 1,091 cases, 159 discontinued the survey **before the randomisation stage** and were therefore excluded from any further analysis resulting in a total sample of 932. Although imputation techniques are appropriate in some cases (Ганева, 2016; Field, 2009), no data were available for the 159 cases to apply imputation. Considering that the experimental method is based on randomisation procedures, researchers argue that respondents who should be excluded are those who were not exposed to any of the experimental procedures and therefore did not receive any treatment (Rehman et al., 2020). The same approach was used in a study on alcohol health warnings (Morgenstern et al., 2021) and such missing cases are defined as unit non-response where data are missing for a whole case (De Leeuw, 2001). To ensure that the randomisation has been successful in the experiment, Chi-square tests were conducted. More specifically, successful randomisation of age, gender, and drinking status between the experimental groups was determined (see Table 6.1).

Out of 932 eligible participants (see Figure 6.1), 270 cases were further excluded from the first model due to the study design (n = 242), multivariate outliers (n = 28) and

straightliners (n =5). In the second model, out of 932 cases, 94 were never drinkers who did not answer questions on risk perceptions and self-efficacy and 65 were outliers. Finally, 153 cases were excluded from the third model as these were identified as multivariate outliers. The sample sizes and excluded cases are also reported as footnotes in Sections 6.4.2, 6.4.3 and 6.4.4.

Figure 6.1: *Flow of Participants Through the Between-Subjects Factorial Survey Experiment*



Note. HW = health warnings;. Model 1 = 657 eligible for analysis; Model 2 = 773 eligible participants for analysis ; Model 3 had the same number of included/excluded cases in each condition.

Table 6.1

Randomisation Check

Conditions	**age groups** (*n* = 889)				Total	**Gender** (*n* = 886)		Total	**Drinking status** (*n* = 932)		Total
	18-25	26-35	36-45	46+		Male	Female		never drinkers	drinkers	
Control 1	53	20	17	28	118	59	58	117	10	111	121
Control 2	68	21	10	15	114	49	66	115	10	111	121
Group 3	61	22	13	15	111	50	61	111	8	110	118
Group 4	64	19	10	20	113	49	63	112	9	106	115
Group 5	54	21	16	14	105	45	60	105	10	101	111
Group 6	49	28	14	25	116	51	63	114	9	112	121
Group 7	50	25	13	21	109	43	66	109	10	104	114
Group 8	54	21	13	15	103	43	60	103	17	94	111
	453	177	106	153	889	389	497	886	83	849	932
Chi^2 Test:		$\chi^2_{(21)}=19.92$ $p=.526$				$\chi^2_{(7)}=3.31$ $p=.855$			$\chi^2_{(7)}=6.89$ $p=.440$		

Note. Control group 1 = an alcohol ad displaying only the product; Control group 2 = an alcohol ad with social imagery; Group 3 = single-text HW in an alcohol ad displaying only the product; Group 4 = single-text HW in an alcohol ad with social imagery; Group 5 = image-and-text HW in an alcohol ad displaying only the product; Group 6 = image-and-text HW in an alcohol ad with social imagery; Group 7 = multiple-text HW in an alcohol ad displaying only the product; Group 8 = multiple-text HW in an alcohol ad with social imagery.

6.2.2 Participant Profile

A complete breakdown of participant baseline characteristics in each experimental condition is given in Table 6.1. Of the study sample, 44% were male and 56% were female. As only 6 participants preferred not to say their gender, they were not included in any further analysis. Participants were 75.6% Irish and 19.7% non-Irish citizens. For age, 70.9% were aged between 18 and 35 (n = 630), and 29.1% were aged 36 or over (n = 259), with an average (M = 30 years, SD = 12.5). For some statistical models, participants were categorised into two groups of young adults (aged 18-25 years; n = 453) and older adults (aged 26 or above, n = 436) based on previous research (Winstock et al., 2020). Three groups were not deemed beneficial here as adding more age categories increases the age gap distribution.

Significantly more drinkers were present in the sample (91.8%) compared to non-drinkers (8.2%). The proportion gap between current drinkers vs. never drinkers is to some extent comparable to national surveys (91.8% in this sample vs. 74.2% in the National Alcohol and Drug Survey 2019-2020). In the current study, 8.2% of respondents were non-drinkers, while in a national survey 25.7% were classified as non-drinkers (Mongan et al., 2021). Although a discrepancy has been found here this is due to the way in which the national survey framed this question, where a 12-month timeframe was used. As no timeframe was used in the current study a much lower level of non-drinkers is to be expected. Having less non-drinkers in the sample may also be seen as a favourable outcome given that health warnings are aimed at drinkers and their attitudes to drinking.

Table 6.2

Participant Baseline Characteristics According to Experimental Conditions

Variables	Control 1		Control 2		Group 3		Group 4		Group 5		Group 6		Group 7		Group 8		Full sample	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Gender																		
Male	59	50	49	42.6	50	44.6	49	43.4	45	42.9	51	44.0	43	39.4	43	41.3	389	43.6
Female	58	49.2	66	57.4	61	54.5	63	55.8	60	57.1	63	54.3	66	60.6	60	57.7	497	55.7
Drinking Status																		
Never Drinkers	10	1.1	10	1.1	8	0.9	9	1.0	10	1.1	9	1.0	10	1.1	17	1.8	83	8.9
Current Drinkers	111	11.9	111	11.9	110	11.8	106	11.4	101	10.8	112	12.0	104	11.2	94	10.1	849	91.1
Age (years)																		
18-25	53	44.9	68	59.6	61	55	64	56.6	54	51.4	49	42.2	50	45.9	54	52.4	453	51.0
26-35	20	16.9	21	18.4	22	19.8	19	16.8	21	20.0	28	24.1	25	22.9	21	20.4	177	19.9
36-45	17	14.4	10	8.8	13	11.7	10	8.8	16	15.2	14	12.1	13	11.9	13	12.6	106	11.9
46+	28	23.7	15	13.2	15	13.5	20	17.7	14	13.3	25	21.6	21	19.3	15	14.6	153	17.2
Nationality																		
Irish Citizen	96	10.8	94	10.6	91	10.2	93	10.5	86	9.7	82	9.2	77	8.7	86	9.7	705	79.3
Non-Irish Citizen	22	2.5	20	2.2	20	2.2	19	2.1	19	2.1	34	3.8	32	3.6	18	2.0	184	20.7

Note. HW = health warning; Control group 1 = an alcohol ad displaying only the product; Control group 2 = an alcohol ad with social imagery; Group 3 = single-text HW in an alcohol ad displaying only the product. Group 4 = single-text HW in an alcohol ad with social imagery; Group 5 = image-and-text HW in an alcohol ad displaying only the product; Group 6 = image-and-text HW in an alcohol ad with social imagery.Group 7 = multiple-text HW in an alcohol ad displaying only the product; Group 8 = multiple-text HW in an alcohol ad with social imagery.

6.2.3 Missing Values

Data were assessed for missing values as differentiating item non-response from actual missing data was necessary based on the study design. This type of missing data is commonly seen in factorial experiments where different questions are assigned to different participants, depending on the goal of the study and the experimental conditions (De Leeuw, 2001). To reflect this, it was important to differentiate the real missing cases from those participants who did not need to answer particular questions due to the study design. Following Field's (2009) recommendations, inserting -99 was deemed appropriate to differentiate the real missing cases from those participants who skipped questions as part of the survey design (see Appendix B for details on the survey flow and the order of questions). All variables were then explored for missing values through frequency tables and descriptive statistics.

Of the participants, 4.6 % did not state their nationality (n = 43), and age (n = 43) and 4.3% of the total sample failed to specify their gender (n = 40). Missing demographic data range from 4.3% to 4.6%, thus indicating partial non-response (De Leeuw, 2001). Although all questions were compulsory, the demographic questions were placed at the end of the survey, suggesting that some participants closed their browser (dropped out) before finalising the remaining questions. Nonetheless, these responses were kept in the data set as the missing cases were less than 5% for each demographic variable, and the participants who did not answer the questions were still successfully randomised to experimental conditions, with valid responses on all outcome constructs of interest.

Although the variables negative emotions and the believability of health warnings did not have any missing values, as explained above, 242 cases were purposely filtered out as part of the randomisation stage and were not relevant questions for the research participants who were randomised into one of the two control groups and viewed one of two alcohol ads without health warnings. The variables perceived personal risks of alcohol use and self-efficacy to drink less had 94 missing cases, of which 83 reflect the never drinkers group of participants as they were purposively not asked questions on these, with the remaining 11 values classified as actual missing values. Finally, it was found that knowledge of the health effects of alcohol had 17 missing values.

While the presence of a small number of missing values in the data is a result of participants who stopped filling the survey at that point, Little's Missing Completely at Random [MCAR] test was conducted with all continuous variables, which showed that missing values accounted for less than 2% of each scale item, indicating a lack of any concerning patterns in the missing data (p = .055). As a result, imputation techniques were not considered necessary (Jakobsen et al., 2017; see Appendix E for more), and the missing values were treated pairwise in further analysis (Field, 2009). Once data cleaning screening procedures were finalised, the next stage was to test the study research propositions.

6.3.Multinomial Logistic Regression

6.3.1 Assumptions

As mentioned in Chapter 5, to assess the association between health warning designs and recall, multinomial logistic regression was conducted. Multinomial regression can be used to test for associations between categorical and multinomial data and is more robust to violations of multivariate normality and equal variance-covariance across groups (Bayaga, 2010). While for linear regression a relationship must exist between predictors and outcomes (Osborne & Waters, 2003), multinomial regression does not have this assumption, and requires that the log of odds of the dependent to the independent variable is linear (Peng & Nichols, 2003).

Table 6.3

Assumptions Multinomial Regression

Assumption	Violated	Comments
Independence of observations	No	Achieved through study design.
Outcome	No	Binary, multinominal.
Linearity of Independent Variables and logg-odds	Partially	The models were bootstrapped with 2000 samples to verify the accuracy of the statistics and internal validity of the models (Steyerberg et al., 2001). As there were no differences in the study results, the non-bootstrapped models were reported.
Outliers	No	Mahalanobis distance analysis was conducted and influential cases or missing data were filtered out. More on this in Section 6.4.1.
Multicollinearity	Partially	Tested using the variance inflation factor (VIF).This assumption was violated when the multinomial regression model was adjusted for interaction effects. However, high VIF would be expected with the use of interaction terms or dummy variables. The VIF are reported as footnotes and correlations were also calculated for all continious outcomes (see Appendices L and F).

6.3.2 Multinomial Logistic Regression: Recall

Multinomial logistic regression was performed to assess the impact of a number of factors on the likelihood that respondents would recall the health warnings embedded in alcohol ads. Research Proposition 1 (see Chapter 4, Section 4.4) included a hypothesis highlighting that the type of health warning designs will signifcantly predict recall. In addition, Research Propositions 2 and 3 hypothesised for possible differences in recall across demographic groups and alcohol ad content, thus possible interaction effects were considered. More specifically, multinomial logistic regression with interaction terms was used to examine the moderating effect of alcohol ad content and demographics on the relationship between health warning designs and recall. The models contained five independent variables (health warnings, alcohol ads, age, gender, and drinking status) and multicollineriaty was tested using the variance inflation factor (VIF). Due to the significantly more parameters in the model, multicollinearity was present with VIF between 10 and 45 (Field, 2009). The results of the moderated regression analysis were not statistically significant (all *p's* > .05), thus rejecting the proposed hypotheses for moderating effects in Research Propositions 2 and 3. After the non-significant interactions were dropped, the goodness of fit model was acceptable and the VIF values were 1.85 or below for all predictors in the model, signifying no multicollinearity problems (Field, 2009). The Likelihood Ratio and Wald tests were examined to determine the improvement of the model over the baseline intercept-only model (Peng & Nichols, 2003). The full model containing all predictors was statistically significant, (χ^2(12) = 58.067, p < .001), thus the null hypothesis that there is no difference between the model before and after adding the independent

variables was rejected. Main effects were examined based on three categories "recalled nothing," "recalled something from the warning," and "recalled the health warning" (King et al., 2020), with a REF group "recalled nothing." Table 6.4 provides the results of the multinomial regressions.

Table 6.4

Multinomial Regression Examining the Association Between Health Warnings and Recall

		Recalled Something				***Recalled the Warning Concept***			
Variables	*n*	*B*	*ORAdj*	*95% CI*	*p*	*B*	*ORAdj*	*95% CI*	*p*
Warning Conditions									
HW without images	423	REF					REF		
Image-and-text HW (vs. *without an image)*	217	-0.11	0.89	[0.51-1.54]	.688	-0.24	0.97	[0.57-1.64]	.927
Single HWs	433	REF					REF		
Multiple HW (*vs. single HW*)	207	0.13	1.14	[0.67-1.94]	.623	-0.60	0.54	[0.31-0.93]	**.028**
Demographics									
Age	640	0.00	1.00	[0.98-1.01]	.874	-0.00	0.99	[0.97-1.01]	.526
Gender									
Male	275	REF					REF		
Female (*vs. male*)	365	0.14	1.15	[0.74-1.80]	.513	1.02	2.78	[1.78-4.32]	**<.001**
Drinking status									
Never drinkers	61	REF					REF		
Current drinkers (vs. *never drinkers*)	579	-1.05	0.34	[0.14-0.86]	**.023**	-0.73	0.48	[1.80-1.23]	.126
Alcohol Ads Condition									
Product-only	318	REF					REF		
Social imagery (vs. *product only*)	322	-0.22	0.79	[0.51-1.23]	.313	0.12	1.13	[0.73-1.75]	.566
ImageHW*Gender	Wald $\chi2$ (1) = .606 p = .436					Wald $\chi2$ (1) = .507 p = .476			
MultipleHW*Gender	Wald $\chi2$ (1) = .1440 p = .230					Wald $\chi2$ (1) = .025 p = .875			
ImageHW*Age	Wald $\chi2$ (1) = 000 p = .996					Wald $\chi2$ (1) = .146 p = .703			
MultipleHW*Age	Wald $\chi2$ (1) = .124 p = .725					Wald $\chi2$ (1) = .774 p = .379			
ImageHW*DrinkingS	Wald $\chi2$ (1) = .263 p = .608					Wald $\chi2$ (1) = .1267 p = .206			
MultipleHW*DrinkingS	Wald $\chi2$ (1) = .215 p = .643					Wald $\chi2$ (1) = .151 p = .697			
ImageHW*Alcohol Ads	Wald $\chi2$ (1) = .118 p = .731					Wald $\chi2$ (1) = .1267 p = .260			
Multiple HW*Ads	Wald $\chi2$ (1) = .829 p = .362					Wald $\chi2$ (1) = .005 p = .945			

Note. Cases analysed n = 638. Excluded cases due to the control groups *n* = 242; Interaction effects between the health warning condition, advert condition, and demographics, were examined in a seperate model (before main effects were investigated).; Appendix L provides the results for main and interaction effects including collinearity diagnostics and VIF; DrinkingS = Drinking status.
Bold values indicate statistically significant findings.
Nagelkerke R2 = .099
McFadden R2 = .043
Cox and Snell R2 = .087
Likelihood Ratio Tests $\chi2(12) = 58.751$, $p < .001$

The model suggests that multiple health warnings (p = .028), gender (p < .001), and drinking status (p = .023) were significant predictors of health warnings recall. In predicting the likelihood of *recall the warning concept* vs. *recall something from the warning*, the negative beta coefficient (-0.60) associated with multiple warnings implied that participants who viewed multiple warnings were significantly less likely to recall the warning concept than those who viewed single warnings (OR*Adj* = 0.54; 95% CI [0.31- 0.93]; p = .028). However, health warnings with the presence (or absence) of a shocking image was not a significant predictor of recall (OR*Adj* = 0.97; 95% CI [0.57-1.64]; p = .927). It was thus concluded that the hypothesis proposed as part of Research Proposition 1 was partially supported.

The proportion of participants who recalled *something from the warning(s)* – at least one cancer disease from the single warning and at least one warning message from the multiple warnings was not significantly different between those who viewed multiple warnings and those who viewed single warnings (OR*Adj* = 1.14; 95% CI [0.67-1.94]; p = .623) and between those who viewed single warnings with and without a shocking image (OR*Adj* = 0.89; 95% CI [0.51-1.54]; p = .688).

Of age, gender, and drinking status, only women were more likely to recall the warning concept compared to men (OR*Adj* = 2.78; 95% CI [1.78-4.32]; p = <.001), with no significant difference in the category *recall something from the warning*, OR*Adj* = 1.15; 95% CI [0.74-1.80]; p = .513). Compared to never drinkers, current drinkers were less likely to recall *something from the warning* (OR*Adj* = 0.34; 95% CI [.0.14-0.86], p = .023), although recalling *the warning concept* was not significantly different between never drinkers and current drinkers (OR*Adj* = 0.48; 95% CI: [1.80-1.23, p = .126). The

participant likelihood to recall *something from the warning* and recall *the warning concept* did not differ significantly by alcohol ads (OR*Adj* = 0.79; 95% CI [0.51-1.23]; *p* = .313; OR*Adj* = 1.13; 95% CI [0.73-1.75]; p = .566) and age (OR*Adj* = 1.00; 95% CI [0.98-1.01]; p = .874; OR*Adj* = 0.99; 95% CI [0.97-1.01]; p = .526).

6.4 Multivariate and Univariate Analysis of Variance/Covariance

Using univariate (ANOVAs) and multivariate (MANOVAs) analysis of variance, a series of hypotheses were tested for significant differences between the experimental conditions on the outcomes of interest. Model 1 examined differences between alcohol ads with *multiple-text*, *single-text*, and *image-and-text* health warnings on believability and negative emotions while controlling for age, gender, and drinking status. Model 2 tested for significant differences between alcohol ads with *multiple-text*, *single-text*, and *image-and-text* health warnings on perceived personal risks of alcohol use and self-efficacy to drink less while again controlling for age, gender, and drinking status. Model 3 examined for significant differences between the experimental conditions and control groups on knowledge of the health effects of alcohol, particularly on the health conditions shown vs. the health conditions not shown on the warnings. These were: cancer, mental health and pregnancy vs. liver disease, addiction, and drink-drive. For all models, the interaction effects between the warning designs, alcohol ad type (whether with or without social imagery), and demographics were examined with univariate and multivariate models.

6.4.1 Assumptions

A detailed assessment of assumptions was carried out including multivariate normality, sample size, outliers, homogeneity of variance, and multicollinearity (see Table 6.5). These assumptions will be discussed by the subsections to follow.

Table 6.5

Analysis of Variance Assumptions

Assumption	Violated	Comment
Independence of observations	No	Between-groups study design because different participants were exposed to different conditions.
Large sample size	No	The sample size should be considered for factorial experiments. Researchers such as Geuens and De Pelsmacker (2017) suggest that a sample size of 40 participants per experimental conduction is deemed sufficient for analysis.
Univariate and multivariate outliers	No	MANOVA: Assumption tested using Mahalanobis distance. ANOVA: performed as sensitivity analysis to the main models and as such, all analyses were conducted within the same filter on SPSS.
DV are normally distributed within each factor variable(s) group.	No	Achieved through removing multivariate outliers (skewness and kurtosis on the dependent variables assessed). See Section 6.4.1.
Homogeneity of variance/covariance	Partially	MANOVA: Assumption examined using Box's *M* test of equality of covariance. ANOVA: Assumption examined using Levene's Test.
Multicollinearity	No	Assumption tested using VIF for each multivariate model. The values are reported as notes in Sections 6.4.1, 6.4.2, and 6.4.3.

Note. DV = dependent variables; VIF = variance inflation factor; the homogeneity of variance (Box's *M* test) was violated for Model 3; Footnotes with Box'*M* statistic, Levene's Test, and VIF are included as part of each model.

Outliers. Outliers can lead to significant implications concerning statistical power especially when examining mean differences (Wilcox, 2005) and non-normality caused by outliers can be particularly problematic for analysis of variance (Pallant, 2020). As this research is interested in investigating group means, they should either be removed or transformed (Field, 2009), although not all outliers are errors and should be carefully examined on a case-by-case basis (Chan & Grismer, 2021). Univariate outliers were initially identified using the box plots method, where the variables perceived personal risks of alcohol use, recall and health warnings believability, drinking status, gender, and age had no univariate outliers, whereas the variable negative emotions indicated some outliers. The most outliers were found for knowledge of the health effects of alcohol and self-efficacy, and this is likely because some of the questions were rated at the extremes of the scales. These influential cases, however, were removed with Mahalanobis Distance analysis, which is the most common method to evaluate multivariate outliers (Field, 2009). A visual representation of Mahalanobis distance computations is presented in Appendix I, J, and K.

Univariate and Multivariate Normality. Normality was examined from two viewpoints. Firstly, univariate normality was checked using histograms, Q-Q plots and box plots (Oppong & Agbedra, 2016). Secondly, the multivariate distribution of residuals of the dependent variables was examined as part of the MANOVA assumptions (Pallant, 2020). Although the reliability of classic parametric statistical tests is often based on the assumption of normality (Erceg-Hurn & Mirosevich, 2008; Field, 2009), a normal distribution is rarely present with real data (Erceg-Hurn & Mirosevich, 2008; Gunver et al., 2017), and constructs measured on interval scales are often skewed (either positively or negatively, to the left or right) in the social sciences

(Gunver et al., 2017). For example, perceived personal risks of alcohol use measured on a likert scale is likely to be skewed, especially if participants rate their perceptions of alcohol use at the two extremes of the scale.

As multivariate normality could not be examined using SPSS, deviations from normality were examined with the Kolmogorov–Smirnov and Shapiro–Wilk tests (Ghasemi & Zahediasl, 2012), with significant results for all continuous variables ($p \leq .01$). However, the sample in this research was relatively large, and Kolmogorov-Smirnov and Shapiro-Wilk normality tests are less reliable with large sample sizes as the results may indicate non-normality when the data are normally distributed (Erceg-Hurn & Mirosevich, 2008). Despite that the normality violation is not as problematic with a large sample compared to small samples (Chan & Grismer, 2021; Ганева, 2016; Ghasemi & Zahediasl, 2012), the skewness and kurtosis for each continuous variable were examined (Field, 2009), with results indicating that all continuous variables were skewed and kurdic; thus the univariate normality assumption was violated (see Table 6.6).

Table 6.6

Descriptive Statistics of Continuous Outcome Variables

	n	*Min*	*Max*	*Mean*	*SD*	*Variance*	*Skewness* *Kurtosis*	
Variables							Statistic	Statistic
Negative Emotions	690	1.00	5.00	1.79	.829	.688	1.095	.751
Knowledge	926	1.00	7.00	6.27	.902	.814	-3.106	13.425
Believability of HW	690	1.00	7.00	4.49	1.603	2.571	-.304	-.594
Perceived Risks	838	1.00	7.00	2.63	1.484	2.205	.802	-.127
Self-efficacy	838	1.00	7.00	6.14	1.267	1.607	-1.658	2.223

However, the normality violations here were not considered problematic as multivariate analysis of variance requires that the **dependent variables** (collectively) have multivariate normality within groups rather than the entire data in general (Field, 2009). This assumption was met after removing the influential outliers, and the skewness and kurtosis multivariate statistics for the dependent variables (collectively) in each model were within the acceptable value between -2/+2 for skewness and -7/+7 for kurtosis (Hair et al., 2010). Tables 6.7-6.8 present the individual (univariate) skewness and kurtosis statistics on the outcomes of interest without multivariate outliers.

Table 6.7

Model 1: Dependent Variables Without Multivariate Outliers

Descriptive Statistics

	n	*Min*	*Max*	*M*	*SD*	*Skewness*		*Kurtosis*	
Variables						*Statistic*	*SE*	*Statistic*	*SE*
Negative Emotions	657	1.00	3. 67	1.704	.715	.852	.095	-.234	.190
HW Beliavability	657	1.00	7.00	4.487	1.571	-.297	.095	-.567	.190

Table 6.8

Model 2: Dependent variables Without Multivariate Outliers

Descriptive Statistics

	n	*Min*	*Max*	*M*	*SD*	*Skewness*		*Kurtosis*	
Variables						*Statistic*	*SE*	*Statistic*	*SE*
Self efficacy	773	3.50	7.00	6.342	.953	-1.398	.088	.866	.176
Risk Perceptions	773	1.00	6.00	2.479	1.311	.617	.088	-.676	.176

Multicollinearity, Homogeneity of Variances, and Covariances. In MANOVA, the assumption of multicollinearity is concerned with the degree of correlation between the dependent variables, with high correlations indicating that multicollinearity exists (Huberty & Morris, 1989). Variance Inflation Factors (VIF) are reported with respect to each model, and multicollinearity leading to key assumption violations in parametric tests is a VIF value larger than 10 (Field, 2009). Beginning at a value of 1 (no collinearity), a VIF between 1–5 indicates moderate collinearity while values above 5 indicate high collinearity (Field, 2009). See Table 6.5 for details. Once all assumptions were examined, the next stage was to begin the primary analysis with hypothesis testing using a two-way (MANOVA) and factorial ANOVAs.

In the following sections hypotheses from all research propositions will be analysed. Different potential predictors of the efficacy of health warnings were examined to test each hypothesis under Research Propositions 1, 2, and 3.

6.4.2 Model 1: Negative Emotions and Believability

Model 1 involved the factors *health warnings* and *alcohol ads*, aiming to test any interactions between them (Research Proposition 2) and determine any differences between alcohol ads with *multiple-text,* s*ingle-text,* and *image-and-text* health warnings on participants' propensity to believe health warnings and their negative emotions (Research Proposition 1).

After controlling for age*,* gender, and drinking status, a significant main effect of health warnings was found, with a statistically significant difference between the design of health warnings ($F_{(4,1244)} = 11.59$, $p = <.001$, *Wilks' Λ* = .929, *Part.* $H^2 = .04$) on participants' propensity to believe health warnings and their negative emotions. However, it was found that the factor *alcohol ad content* ($F_{(2,622)} = 1.227$, $p = .294$, *Wilks' Λ* = .996) was not statistically significant and that no interaction effect existed between the design of health warnings (*multiple-text,* vs. *single-text* vs. *image-and -text*) and the content of alcohol ads (*product-only* vs. *social imagery;* $F_{(4,1244)} = .531$, $p = .713$, *Wilks' Λ* = .997). The multivariate results are presented in Table 6.9.

Table 6.9

Multivariate Effects of Health Warnings and Alcohol Ads on Negative Emotions and the Believability of Health Warnings in Alcohol Ads

Effect	*Wilk's Λ*	*F*	*df*	$df_{(Error)}$	*p*	*Part.* H^2
Intercept	.676	149.135	2	622	<.001***	.324
HWs	.929	11.59	4	1244	<.001***	.04
Alcohol ads	.996	1.227	2	622	.294	.00
HW*Alcohol Ads	.997	.531	4	1244	.713	.00
Drinking status[a]	.997	.981	2	622	.375	.00
Age[a]	.983	5.193	2	622	<.01**	.02
Gender[a]	.991	2.760	2	622	.064	.01

Note. Cases analysed n = 657; Cases excluded due to Mahalanobis analysis n = 28; Straightliners removed n =5; Cronbach's α for scaled items: negative emotions = (.658); believability = (.752); Box'M test = .899; VIF = 1.013; HWs = health warnings (single-text, image-and-text, multiple-text); Alcohol ads = (product-only vs. social imagery);[a] = Covariates*; Wilk's Λ* = Wilk's lambda statistic; *Part.* H^2 = Partial eta squared; * $p \leq .05$. ** $p \leq .01$. *** $p \leq .001$.

Between-Subject Effects. Table 6.10 illustrates that significant small effects were found on negative emotions (p = <.001; *Part.* H^2 = .04) and believability (p = <.001; *Part.* H^2 = .02; Cohen, 1988). Partial eta squared is the effect size used in analysis of variance, and small, medium, and large effects are classified as .01, .06, and .14 (Cohen, 1988). Given that Research Proposition 3 in Chapter 4 stated that age, gender, and drinking status moderate consumer reactions to health warnings in alcohol ads, data were also analysed using univariate follow-ups ANOVAs with the variables health warning designs (multiple-text, single-text, and image-and-text), drinking status (never drinkers vs. current drinkers), gender (men vs. women), and age (younger 18-25 vs. older 26+). No interaction effects of health warnings, demographics, and drinking status were observed on negative emotions and believability (all p's ≥ .05), thus indicating that drinking status and demographics did not moderate the efficacy of health warnings on these outcomes.

Table 6.10

Between-Subject Effects and Interaction Effects on Negative Emotions and the Believability of Health Warnings

		Negative emotions			Believability of HW		
Mutlivariate Between effects	*df*	*F*	*p*	*Part. H^2*	*F*	*p*	*Part. H^2*
Corrected model	8	5.954	<.001***	.07	2.252	.022*	.03
Intercept	1	152.524	<.001***	.24	182.873	<.001***	.31
HWs	2	14.374	<.001***	.04	7.010	<.001***	.02
Alcohol Ads	1	1.534	.216	.00	1.138	.286	.00
HWs*Alcohol Ads	2	.302	.740	.00	.639	.528	.00
Drinking status[a]	1	.700	.403	.00	.1.590	.208	.00
Age[a]	1	10.287	≤.001***	.01	.675	.412	.00
Gender[a]	1	5.498	≤ .01**	.01	.005	.945	.00
Univariate Analysis – Interactions for Demographics							
HWs*Gender	2	2.908	.055	.009	2.179	.114	.007
Alcohol Ads*Gender	1	.000	.999	.000	.018	.893	.000
HWs*Age	2	.157	.855	.001	1.767	.172	.006
Alcohol Ads*Age	1	.565	.453	.001	.207	.609	.002
HWs*Drinking status	2	.153	.858	.000	.878	.416	.003
Alcohol Ads*Drinking status	1	.768	.381	.001	.281	.596	.000

Note. Cases analysed n= 657; HW = health warnings; Hws = health warnings (single-text, image and text, and multiple-text); Alcohol ads = (product-only vs. social imagery); [a] = Covariates; *Part.* H^2 = Partial eta-squared; Interaction effects between the health warning condition, advert condition, and demographics, were examined with ANOVAs after main effects were investigated).; * $p \leq .05$. ** $p \leq .01$. *** $p \leq .001$.

The most conservative test used in the analysis of variance has been the Bonferroni post hoc test (Field, 2009), and Table 6.11 provides the results of the multiple comparisons between the warning designs on negative emotions and believability. After Bonferroni's adjustment, the believability of health warnings was significantly different between *multiple-text* and *single-text* warnings (p = <.001) and between *multiple-text* and *image-and-text* warnings (p = .049); however no significant differences were found between *single-text* and *image-and-text* (p = .922); thus H2 is partially accepted. As shown by the plot of means in Figure 6.3, the mean score for believability was quite similar for single warnings with and without a shocking imagery.

As for negative emotions, there was significant difference between *multiple-text* and *single-text* (p = .000) and between *multiple-text* and *image-and-text* health warnings (p = .000); but without significant differences between *single-text* and *image-and-text* health warnings (p = 1.000), thus H3 is partially accepted. Overall, the results indicate that *multiple-text* health warnings were more believable than *single-text* and *image-and text* warnings. Whereas *single-text warnings, with and without a shocking image* were more effective in increasing negative emotions compared to *multiple-text* health warnings. See Table 6.11 and Figures 6.2-6.3.

Table 6.11

Multiple Comparisons for Believability and Negative Emotions

Variables			*Mean Difference (I-J)*	*SE*	*p*	95% CI	
HW Believability	multiple-text	single-text	.5130*	.148	.002	.1564	.8696
		image-and-text	.3608*	.149	.049*	.0013	.7203
	Image-and-text	single-text	.1522	.148	.922	-.2053	.5096
		multiple-text	-.3608*	.149	.049	-.7203	-.0013
Negative Emotions	multiple-text	single-text	-.3221*	.066	.000***	-.4827	-.1615
		image-and-text	-.2886*	.067	.000***	-.4505	-.1267
	Image-and-text	single-text	-.0335	.067	1.000	-.1945	.1274
		multiple-text	.2886*	.067	.000***	.1267	.4505

Note. *Means differ at .05 level by Bonferoni's post hoc test.

Figure 6.2

Mean Scores Between Single-Text, Image-and-Text and Multiple-Text Health Warnings on Negative Emotions

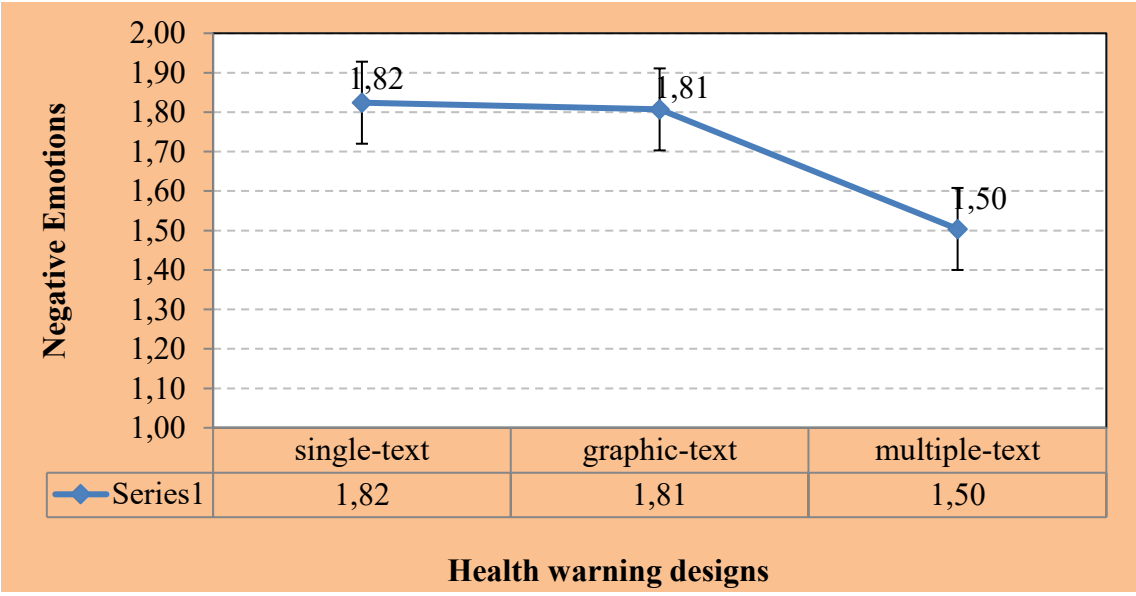
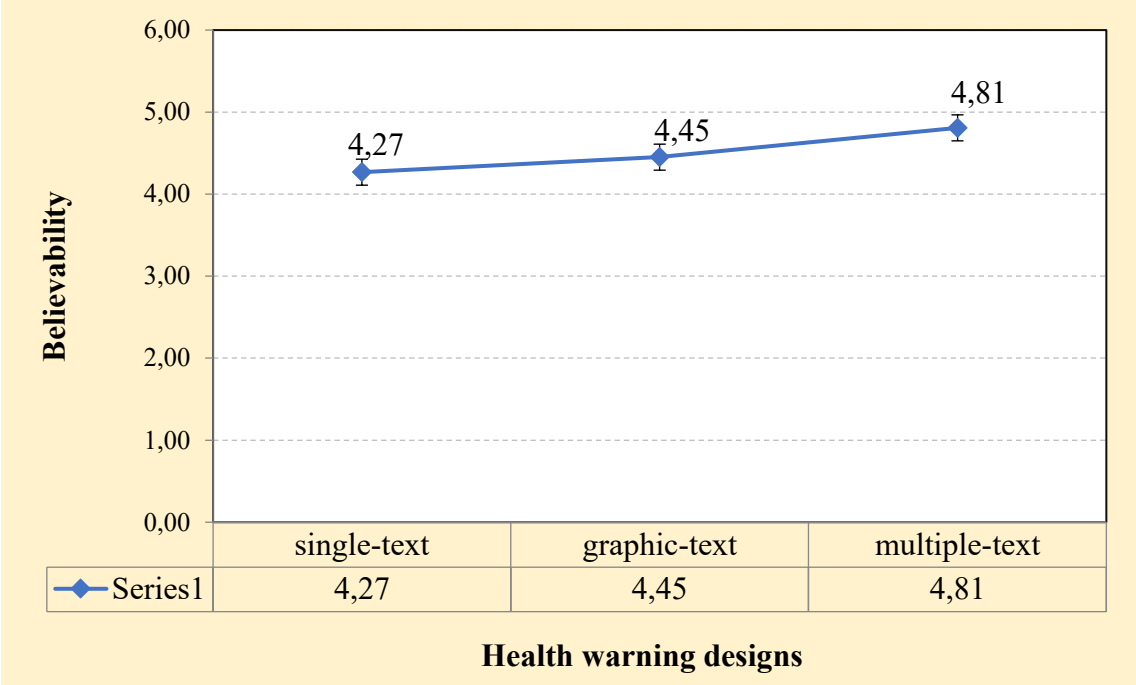


Figure 6.3

Mean Scores Between Single-Text, Image-and-Text and Multiple-Text Health Warnings on Health Warning Believability



6.4.3 Model 2: Perceived Risks of Alcohol Use and Self-Efficacy

A MANOVA with follow-up univariate tests was used to test predictions in all research propositions concerning the effect of alcohol ads with *multiple-text, single-text* and *image-and-text* health warnings—displayed on *social imagery* versus *product-only* alcohol ads—as the independent variables (factors)—on perceived personal risks of alcohol use and self-efficacy to drink less—as the dependent variables. Multivariate and univariate results are shown in Table 6.12. As part of Research Proposition 1, it was proposed that the perceived risks of alcohol use and self-efficacy to drink less will differ significantly for alcohol ads with *multiple-text*, *single-text*, and *image-and-text* health warnings. Thus H4 and H5 were rejected ($F_{(4,1468)} = .236$, $p = .918$, *Wilks' Λ* = .999).

As part of the Research Proposition 2 reported in Chapter 4, it was proposed that an interaction effect would exist between health warnings and alcohol ads; this hypothesis also was rejected, with findings suggesting that the factor *alcohol ads (*$F_{(4,1468)} = .922$, $p = .450$, *Wilks' Λ* = .995) was not statistically significant and that no interaction effect existed between the design of health warnings (*multiple-text* vs. *single-text* vs. *image-and -text*) and the content of alcohol ads (*product-only* vs. *social imagery;* $F_{(2,1468)} = 1.139$, $p = .336$, *Wilks' Λ* = .994). In the absence of significant main effects, a between-subjects comparison and Bonferroni post hoc tests are not reported here but can be found in Appendix J.

In line with Research Proposition 3, multiple ANOVAs were conducted with the variables health warnings (*multiple-text*, *single-text,* and *image-and-text*), alcohol ads (product only vs. social imagery), gender (women vs. men) and age (younger, 18-25 vs. older, 26+). In the ANOVAs, there were no significant interaction effects ($p's \geq .05$) between health warnings and demographics on perceived risks of alcohol use and self-efficacy to drink less, indicating that age and gender did not moderate the efficacy of health warnings on these outcomes.

Table 6.12

Multivariate Effects of Health Warnings and Alcohol Ads on Perceived Personal Risks of Alcohol Use and Self-efficacy to Drink Less

Multivariate Effect	*Wilk's Λ*	*F*	*df*	$df_{(Error)}$	*p*	*Part.* H^2
Intercept	.200	1464.204	2	734	<.001***	.85
HWs	.999	.236	4	1468	.918	.001
Alcohol Ads	.995	.922	4	1468	.450	.003
HWs*Alcohol Ads	.994	1.139	4	1468	.336	.003
Age[a]	.991	3.61	2	734	<.001***	.068
Gender[a]	.986	5.37	2	734	<.001***	.025
Univariate analysis - Interactions for Demographics						
HW*Gender for self-efficacy		2.590	2	725	.076	.007
HW*Gender for risk perceptions		1.925	2	725	.147	.005
Ads*Gender for self-efficacy		.570	2	725	.566	.002
Ads*Gender for risk perceptions		.152	2	725	.859	.000
HW*Age for self-efficacy		.912	2	729	.402	.002
HW*Age for risk perceptions		.431	2	729	.631	.001
Ads*Age for self-efficacy		.255	2	729	.775	.001
Ads*Age for risk perceptions		.356	2	729	.701	.001

Note. Cases analysed n = 773; Cases excluded due to Mahalanobis analysis n = 65. Cronbach's α for Cronbach's alpha for scaled items: self-efficacy =(.671); perceived risks of alcohol use = (.820); Box'*M* test = .553; VIF = 1.096; HWs = health warnings (single-text vs. image-and-text vs. multiple-text); Alcohol ads = (product-only vs. social imagery);

[a] = Covariates*;* Drinking status was not examined in this model as *never drinkers* did not answer questions on risk perceptions and self-efficacy. *Part. H2* = Partial eta-squared*; Wilk's Λ* = Wilk's lambda statistic;; *$p \leq .05$, ** $p \leq .01$, *** $p \leq .001$.

6.4.4 Model 3: Knowledge of the Health Effects of Alcohol

Model 3 examined whether including any warning had an impact on knowledge of alcohol-related harm, particularly whether knowledge of the health conditions depicted on the warnings is higher among the experimental groups compared to the control groups. MANOVA was used to examine how knowledge of the health effects of alcohol differed in participants who were assigned to view alcohol ads with health warnings compared to those who were assigned to view alcohol ads without warnings (control groups). Each of the six statements measuring knowledge were treated as dependent variables. The knowledge-related statements which were not shown on the warnings were: alcohol can be addictive, drinking impairs the ability to operate machinery, and alcohol can cause liver disease(s). Whereas the statements which were shown on the health warnings were drinking alcohol when pregnant harms the unborn baby, alcohol can cause cancer of the mouth, pharynx, larynx, oesophagus, liver, pancreas, bowel and breast, and alcohol can cause mental health problems (See Chapter 5, Sect. 5.5.3).

Contrary to what was predicted, the model was not significant and H6 was rejected ($F_{(6,790)} = .2.059$, $p = .056$, *Wilks' Λ* = .985). The multivariate and univariate interactions proposed in Research Propositions 2 and 3 are not significant as no interation effects were found between health warnings and alcohol ads *(*$F_{(6,790)} = 1.371$, $p = .220$, *Wilks' Λ* = .990) and health warnings and demographics (p*'s* ≥ .05), indicating that Research Propositions 1, 2, and 3 were not supported. See Table 6.13

Table 6.13

Multivariate and Interaction Effects of Health Warnings and Alcohol Ads on Knowledge of the Health Effects of Alcohol

Multivariate Effect	*Wilk's Λ*	*F*	*df*	$df_{(Error)}$	*p*	*Part.* H^2
Intercept	.005	27064.637	6	790	<.001***	.995
HWs vs. No HWs	.985	2.059	6	790	.056	.015
Alcohol Ads	.995	.659	6	790	.683	.005
HWs vs. No HWs*Alcohol Ads	.990	1.371	6	790	.223	.010
Interactions for Demographics						
HWs*Gender	.980	1.245	12	1498	.246	.010
Alcohol Ads*Gender	.982	1.160	12	1498	.307	.009
HWs*Age	.981	1.235	12	1506	.573	.007
Alcohol Ads*Age	.990	.647	12	1506	.803	.005
HWs*Drinking status	.983	1.085	12	1556	.369	.008
Alcohol Ads*Drinking status	.983	1.085	12	1556	.368	.008

Note. Cases analysed n = 799; Cases excluded due to missings and Mahalanobis analysis n = 116; ; Box'M test = <.001; VIF = between 1.145 and 1.590; HWs = health warnings (single-text vs. image-and-text vs. multiple-text); Alcohol ads = (product-only vs. social imagery); [a] = Covariates;. *Part. H2* = Partial eta-squared; *Wilk's Λ* = Wilk's lambda statistic;; *$p \leq .05$, ** $p \leq .01$, *** $p \leq .001$.

Table 6.14

Summary of Hypotheses

Hypothesis	Analysis	Result
H1: The type of health warnings will significantly predict whether the participants will recall the warning concept.	Multinomial Regression	Partially Supported
H2: Participants' propensity to believe health warnings will differ significantly for alcohol ads with multiple-text, single-text and image-and-text health warnings.	MANCOVA	Partially Supported
H3: Negative emotions will differ significantly for alcohol ads with multiple-text, single-text and image-and-text health warnings.	MANCOVA	Partially Supported
H4: The perceived personal risks of alcohol use will differ significantly for alcohol ads with multiple-text, single-text and image-and-texthealth warnings.	MANCOVA	Rejected
H5: Self-efficacy to drink less will differ significantly for alcohol ads with multiple-text, single-text, and image-and-text health warnings.	MANCOVA	Rejected
H6: Participants' knowledge of the health conditions shown on the warnings (cancer, mental health, and pregnancy) and not shown on the warnings (liver, addiction, and drink-drive) will differ significantly between those exposed to the health warning conditions and those who were randomised to the control groups.	MANOVA	Rejected
H7: The content of alcohol ads (product only vs. social imagery) will moderate the efficacy of health warnings on recall, and consumer cognitive and affective reactions.	MANOVA	Rejected
H8: Age (H8a), gender (H8b), and drinking status (H8c) will moderate the efficacy of health warnings in alcohol ads on recall, and consumer cognitive and affective reactions.	ANOVAs/MANOVAs/Multinomial Regression	Rejected

6.5 Conclusion

This chapter presented the findings from the proposed research propositions in Chapter 4. The first research proposition tested a number of hypotheses, with results suggesting a significant association between the health warning designs and recall and the first major finding this chapter demonstrates is that multiple health warnings are less likely to be recalled compared to single warnings but adding a shocking imagery did not lead to different levels of recall. Findings also showed that being a female and never-drinker predicted increased recall of health warnings, whereas age was not a significant predictor. Next, believability was higher for those exposed to multiple health warnings compared to those exposed to single warnings, with and without a shocking imagery, while negative emotions were higher for those exposed to single warnings focusing on cancer compared to those exposed to multiple warnings illustrating multiple health conditions. However, no main effects of alcohol ads with multiple-text, single-text or image-and-text health warnings were observed on the participants' perceived personal risks of alcohol use, self-efficacy to drink less and knowledge of the health effects of alcohol. The findings suggest that some of the hypotheses under Research Proposition 1 were partially accepted, whereas the hypotheses under Research Proposition 2 and 3 were rejected.

Possible explanations for findings, theoretical and practical implications, and potential areas for future research are discussed in Chapter 7.

CHAPTER 7: DISCUSSION AND CONCLUSIONS

Results, contributions, policy implications, suggestions for further research

7.1 Introduction

This thesis investigated a novel alcohol policy requirement in Ireland, introducing multiple health warnings in alcohol advertisements. The PHAA requires all alcohol ads to include 1) a pregnancy warning, 2) a general warning, 3) a cancer warning, and 4) a link to a government website providing health information about alcohol. These warnings constitute a major step forward from existing general warnings in alcohol ads (e.g., alcohol can damage your health) legislated in other European countries. Given that Section 13 of the Act requires multiple alcohol advertising health warnings to be displayed simultaneously, the necessity of studies that examine the impact of these health warnings in this context is pressing (Critchlow & Moodie, 2022). In examining individuals' cognitive and affective reactions to health warnings in alcohol ads, this dissertation addressed this gap.

One of the two research objectives introduced in Chapter 1 asked whether viewing single-text, multiple-text, and image-and-text health warnings in alcohol ads would lead to changes in individuals' recall, cognitive, and affective reactions and which combination of health warnings is more impactful. The second research objective investigated the extent to which differences in individuals' reactions to health warnings are dependent on the content of alcohol ads, with a particular focus on whether the presence of social imagery in alcohol ads decreases the efficacy of health warnings. The

cumulative finding of this thesis is that health warnings in alcohol ads can indeed modify consumer responses, independent of the content of alcohol ads.

In this chapter, a summary of the results is provided, the key contributions that the thesis has made are outlined, and a detailed discussion of the theoretical implications of the study results is then discussed. The concluding chapter also outlines the research limitations of this work, proposes suggestions for further research, and concludes with important practical implications with respect to alcohol policy in Ireland and elsewhere.

7.2 Summary of Research Propositions

- **Research Proposition 1** dealt with participants' **recall (H1)** of single and multiple health warnings in alcohol ads, with results suggesting that alcohol ads with multiple-text warnings were significantly less likely to be recalled than alcohol ads with with a single warning, whether with or without an image accompanying the text. This proposition also included a number of hypotheses which tested for differences between single-text, image and text, and multiple-text alcohol advertising warnings on the **believability** of health warnings (H2) and **negative emotions** (H3). The study results demonstrated that alcohol ads with single-text warnings, both with and without a shocking image, led to higher negative emotions than alcohol ads with multiple-text health warnings. However, participants who viewed alcohol ads with single-text cancer warnings were less likely to believe the warnings, whereas the opposite was true for participants who viewed alcohol ads with multiple-text health warnings. H5 and H6 predicted significant differences between single-text, image-and-text, and

multiple-text warnings on participants' **knowledge** of the health effects of alcohol and **perceived personal risks** of alcohol use. However, there were no significant differences between the experimental conditions on these outcomes.

- **Research Proposition 2** investigated the role of alcohol ad content in the effectiveness of health warnings and whether an alcohol ad with **social imagery** (compared to an alcohol ad featuring only the product) will decrease participants' recall, the propensity to believe health warnings, their negative emotions, knowledge of the health effects of alcohol, perceived personal risks of alcohol use and self-efficacy to drink less (H7). The objective was to determine whether the content of alcohol ads moderates (interacts with) any of the three warning designs tested here on the aforementioned outcomes. Results showed that the social imagery contained in an alcohol ad did not reduce the effectiveness of health warnings, as no evidence for an interaction between positive (alcohol ad cues) and negative information (warning cues) were found. In this sense, the warning designs had a more prominent influence than alcohol ad content on consumer recall, cognitive, and affective reactions.

- **Research Proposition 3** tested whether age, gender, and alcohol use (H8a-b-c) moderate the efficacy of health warnings in alcohol ads, and corresponding results from Chapter 6 demonstrated a lack of moderating effects on the outcomes examined.

7.3 Key Contributions

The findings from this study make several contributions to the academic literature, which are outlined next, followed by a detailed discussion of the implications of the study results.

7.3.1 Context—Alcohol Advertising

This research makes a significant contribution to our understanding of consumers' reactions to health warnings in alcohol ads, as prior to this, the research has overwhelmingly either focused on entirely different product categories (such as tobacco) or has focused on alcohol product labelling. There are a number of studies that have considered health warnings in advertising but were primarily focused on the influence of alcohol ad content (e.g., Diouf & Gallopel-Morvan, 2020; Dossou et al., 2017; Dossou & Gallopel-Morvan, 2020), warning labels in the form of user-genereted comments (Noel, 2021; Noel & Lakhan, 2021), age warnings in social media (Lou & Alhabash, 2020), self-regulated "drink responsibly" messages (e.g., Farace et al., 2020; Kersbergen & Field, 2017b; Noel, 2021; Noel & Lakhan, 2021), or on industry-related outcomes such as consumer perceptions of advertising, purchase intentions, and product appeal (Effertz et al., 2013; Hammond et al., 2021; King et al., 2020; Mays et al., 2019; Niederdeppe et al., 2019; Strasser et al., 2012). In particular, while there are some studies which examined cognitive and affective reactions (e.g., Fisher et al., 1993; Mays et al., 2016; Niederdeppe et al., 2019; Strasser et al., 2012), these papers were focused on e-cigarette/tobacco advertising. This thesis thus provides evidence to support

mandated health warnings embedded in alcohol advertisements, which are due to come into effect according to Section 13 of the PHAA.

7.3.2 New Health Warning Designs Combination

Multiple-Text Health Warnings in Alcohol Ads. This research is the first to provide evidence of the potential impact of multiple-text health warnings on alcohol ads. Furthermore, multiple-text warnings have not previously been tested on alcohol product labels. Because the data indicates that using multiple-text warnings is less effective than a single message focusing on cancer, these findings raise questions as to whether using multiple text information is the most appropriate combination of health warnings for alcohol ads. See Section 7.4.1 for a detailed discussion on this.

Image-and-Text Health Warnings in Alcohol Ads. Although it is not yet required for the alcohol industry to place shocking imagery on their ads, this thesis tested the potential impact of an image-and-text health warning on consumer recall, cognitive and affective reactions. For some time, tobacco health warnings with shocking images have been in use to successfully influence consumer reactions to health warnings (Francis et al., 2019; Noar et al., 2020; Noar, Francis, et al., 2016; Noar, Hall, et al., 2016; Pang et al., 2021), and it is possible that policymakers will follow this same trajectory to that of tobacco as a public health tactic in reducing alcohol consumption. Thus, this study is a step ahead of current policy and brings a new contribution to knowledge in this area.

This thesis did not support evidence for significant differences between single-text and image-and-text health warnings, suggesting that findings in the literature on product

health warnings do not translate to alcohol advertising warnings, and possible reasons for that are discussed in Section 7.4.1. As a result, the comparison between warnings with and without a shocking image has been suggested for further research.

Single-Text Health Warnings Focusing on Cancer. This research extends previous findings on alcohol product labels by testing cancer warnings, with and without shocking imagery, in alcohol ads and by using a specific cancer warning format (eight fatal cancers) that has not previously been examined. Another contribution related to cancer was that negative emotions have a key role in the effectiveness of health warnings, suggesting that fear and negative emotions are an important pathway of influence. This is the first study to examine negative emotions as an outcome in research on alcohol advertising health warnings. It supports previous findings in the literature on alcohol product warnings by demonstrating evidence that the positive effects of cancer warnings found on alcohol products translate to the context of alcohol advertising and further indicates that the theory of fear appeals holds in the context of alcohol advertising health warnings and supports the idea that **cancer** health warnings in alcohol ads can provoke affective reactions in consumers.

7.3.3 Social Imagery Alcohol Ads

This is the first study that has tested social imagery alcohol ad interaction with multiple-text, single-text, and image-and-text health warnings. While there is a wider public health rationale for limiting social imagery in alcohol ads, based on this study, it would appear that the presence or absence of social cues did not impact the effectiveness of health warnings. This research extends emerging work that investigates the content

appeal of alcohol ads with health warnings (e.g., Diouf & Gallopel-Morvan, 2020) and found that social images (typical of many alcohol ads) appear to have little impact on individuals' cognitive and affective reactions to health warnings and did not decrease their effectiveness. In this study, the impact of health warning designs in alcohol ads appears to be significantly stronger than that of alcohol ad content for all outcomes. The theoretical and practical implications with respect to ad content are further discussed in Section 7.4.5.

7.3.4 Recall, Believability of Health Warnings in Alcohol Ads, Participants' Knowledge of the Health Effects of Alcohol and their Perceived Personal Risks of Alcohol Use

The literature review from this thesis outlines that health warnings influence cognitive and affective reactions that are theoretically relevant and important antecedents of consumer behaviour. However, no previous research has examined the recall and believability of multiple-text health warnings and single-text (cancer) health warnings with, and without a shocking image in alcohol ads. This thesis is a step ahead of previous work as it has considered outcomes including recall, individual propensity to believe multiple-text and cancer-focused health warnings, negative emotions, perceived personal risks of alcohol use, knowledge of the health effects of alcohol and self-efficacy to drink less. This combination of antecedents and outcome variables has not previously been examined in this context.

7.3.5 New Alcohol Brand Design

The health warnings literature (especially in the context of alcohol) relies heavily on experimental studies using existing products or brands as part of their experimental investigations. It appears that there is scant experimental research on health warnings using mock newly developed alcohol brands. This thesis goes beyond previous research as the experimental manipulation involved a new alcohol brand (*Blue Wave Irish Lager*) and two newly-designed alcohol ads, which could also be used in follow-up studies. Therefore, this research has methodological advantages over some other experimental studies in the area, as it was further ensured that all components (experimental stimuli) across conditions are identical in terms of all elements, such as the warning's size and colours and the background of the alcohol ads. It is thus possible to conclude that all differences observed are attributed to the experimental stimuli and not due to other confounding factors (e.g., brand familiarity) that may bias the internal validity of the findings.

7.3.6 Individual-Level Differences

Experimental studies tend to overlook individual differences in examining health warnings on packaging and advertising. Demographic differences have practical significance and are important here, given the nascent nature of research in this context. The current study does not provide evidence that certain population groups are more responsive to health warnings than others. The lack of significant differences have some theoretical and practical implications, particularly that the absence of moderating effects

indicates that health warnings in alcohol ads could generalise across demographic groups —an important finding for alcohol policy.

7.4 Discussion

The study findings suggest that viewing alcohol ads with health warnings have an impact on recall, cognitive and affective reactions, and the following sections provide a detailed discussion based on the study results and the aforementioned contributions.

7.4.1 Recall of Health Warnings in Alcohol Ads

Multiple-Text Versus Single-Text Health Warnings. This research found that multiple warnings are less likely to be recalled compared to single warnings in alcohol ads. This finding is particularly novel as no study to date has examined multiple warnings in alcohol ads. It is difficult to make direct comparisons between this study as no authors have employed the same health warning designs as those utilised here. However, in a content analysis study, gambling print ads were analysed for the presence of age warnings, terms and conditions, and harm-related messages, with findings suggesting that while terms and conditions were displayed in 20% of the ad space, the message was hard to read because of the complex load of information presented in a small font (Critchlow, Moodie, et al., 2020).

In this study, multiple warnings were also displayed on 20% of the ad space, thus reducing their visibility compared to the single warnings, and it may be that multiple exposures are required to recall the text messages (Lochbuehler et al., 2018). From a

theoretical perspective, the design stage aims to increase recall and enhance comprehension of the warning message (Laughery & Wogalter, 2006), and it is likely that alcohol ads with multiple-text warnings featuring a 1) pregnancy warning, 2) a mental health warning, 3) a cancer warning and 4) a link to a website for health information about alcohol did not lead to increased recall due to their number and length. Some of the issues emerging from the study finding relate specifically to the potential drawbacks of using multiple texts concurrently in the format of text messages as part of a group, which brings forward important theoretical implications for developing well-designed health warnings in alcohol ads and products. Recall of health warnings is central to text comprehension (Rouet & Britt, 2011), and an implication of this is that the design of health warnings should be kept simple as viewers do not dedicate a lot of effort to process lengthy information (Laughery & Wogalter, 2006).

The communication-human information processing model [C-HIP] involves several subsequent stages that determine the effectiveness of health warnings: source, channel, attention (noticing and recall), comprehension, attitudes and beliefs, motivation, and behaviour (Laughery & Wogalter, 2006). Although all warnings in this study were of equal size, lengthy warnings can reduce attention and the storage of information in memory (Laughery & Wogalter, 2006; Wogalter, 2018). The recall scores of multiple-text health warnings may also be explained by the cognitive load theory [CLT], which has been used to explain the process of individual learning and is concerned with long-term and short-term memory (Kirschner et al., 2018). However, long-term memory can be developed over time through repeated exposure to stimuli (Hu et al., 2017), and repeated exposure to alcohol ads with health warnings may have a different impact. Therefore, long-term memory is not considered a dimension that needs further

elaboration here. In the context of short-term memory, the CLT suggests that individuals can process only a limited amount of information simultaneously, and under most circumstances, particularly concerning short-term memory, more text will require greater mental effort, leading to an excessive cognitive load (Sweller, 1988).

Hence, the theory supports the assumption that multiple-text warnings in the format of four text health messages tended to be more challenging to notice in alcohol ads and require greater cognitive engagement to process the information. Furthermore, having four health messages containing information on eight different fatal cancers, pregnancy, and mental health disorders alongside a website link may have been challenging for consumers to prioritise, particularly in the presence of the alcohol ad content itself – this also aligns with the ELM, suggesting that more effort is required to process the information in the presence of peripheral cues (ads). As some warning design fetures such as size and colour were not manipulated in this study, it is not entirely clear whether multiple-warnings are ineffective overall or because of their design features.

Single-Text Health Warnings With and Without an Image. Overall, exposure to alcohol ads with single-text vs. image-and-text health warnings did not yield significant differences on any outcomes, including recall, participants' propensity to believe health warnings, negative emotions, knowledge of the health effects of alcohol, perceived personal risks of alcohol use and self-efficacy to drink less. The tobacco literature on product health warnings has demonstrated that image-based warnings are more effective than single-text health warnings in influencing consumer cognitive and affective reactions (Hammond, 2011; Noar et al., 2017; Noar et al., 2020), and that image warnings on cigarette advertising (e.g., Klein et al., 2015; Stark et al., 2008; Strasser et

al., 2012) and on tobacco products (Francis et al., 2019; Noar et al., 2020; Noar, Francis, et al., 2016; Noar, Hall, et al., 2016; Pang et al., 2021) increase recall levels. However, the current results support previous research on alcohol product warnings in that it did not find significant differences between warnings with the presence or absence of images on some precursors to consumer behaviour (Clarke et al., 2020; Jones et al., 2022; Morgenstern et al., 2021; Wigg & Stafford, 2016). The lack of significant differences in this study might be attributable to the nature of the sample used in this research, the context, and the way this construct was measured.

The current finding is also in line with a more recent alcohol study (Morgenstern et al., 2021), which examined various health messages such as liver cirrhosis, cancer, mental health, minors, addiction, accidents, and pregnancy, with findings highlighting no significant differences between single-text and image-and-text warnings focusing on cancer. Although the study examined statements without displaying them visually on products or alcohol ads, it demonstrates that the non-significant differences reported here between single-text and image-and-text on negative emotions could be attributed to the cancer-focused content, and results could differ if other health-related messages would have been utilised.

The current finding is also in line with a recent study of health warnings on alcohol packaging, which found no significant differences between text warnings with and without images (Jones et al., 2022). Cancer health warnings, particularly in alcohol ads, have not been used previously, and they are likely to be a new experience for the research participants. A similar explanation was provided by Jones et al. (2022), who argued that the lack of exposure to large and content-specific health warnings on

alcohol product labels might explain why individuals' reactions did not differ with respect to text warnings with and without an image. Given the findings reported here and those by Jones et al. (2022), the lack of significant differences between text warnings with and without an image may also be due to existing social norms. For example, Hammond (2011) argued that social norms could moderate the effectiveness of tobacco health warnings. Despite the similarities between tobacco and alcohol consumption in terms of health-related harm, some people appear to be highly sceptical of messages related to alcohol and cancer and question the causal relationship between the two (May et al., 2022). Furthermore, tobacco marketing is far less prevalent than alcohol marketing, and there has been a significant move towards the denormalisation of tobacco consumption, thus making tobacco health warnings more normative. As a result, social norms with respect to smoking behaviour have changed over time due to strict tobacco control measures and public support (World Health Organization, 2003). This has not happened with respect to alcohol.

7.4.2 Believability of Health Warnings in Alcohol Ads

This is the first study to compare individuals' propensity to believe cancer, image-based, and multiple-text health warnings in alcohol ads, with results suggesting that single warnings, with and without an image, focusing on cancer warnings were less believable than multiple warnings. This result extent previous findings by examining the believability of three diffferent warning designs in alcohol ads rather than just focusing on cancer warnings alone. As the literature on product health warnings have been focused on text-only versus graphic warnings, one possible explanation is that perceived threat beliefs and familiarity influence the way a health warning is processed

(Wogalter, 2018), and the increased believability of multiple-text warnings may be attributed to the presence of pregnancy and mental health warnings (in addition to a cancer warning) with which the research participants are more familiar. As individuals have limited capacity to process multiple textual information, they need to prioritise the information based on preexisting knowledge (Sweller, 1988).

On the other hand, participants' propensity to believe single-text cancer warnings with and without an image was lower much in the same way as text and image-based cancer health warnings on alcohol products (Andrews et al., 1990; Hall et al., 2020; Winstock et al., 2020). This finding has important implications, as it appears that the research participants in this study did not believe information related to alcohol consumption and cancer. Similarly, a recent UK qualitative study found that people were unaware that alcohol causes cancer, and this health information was rather surprising to the research participants (Jones et al., 2021). The results reported here thus suggest that lower believability of cancer warnings found for alcohol products also translate to alcohol advertising, and it should be considered that the consistent findings of low cancer believability do not make them less effective as they do not necessarily have to be believable to be persuasive (Hall et al., 2020; Winstock et al., 2020). However, as with tobacco health warnings, believability will increase over time with repeated exposure.

7.4.3 Negative Emotions and Fear Appeals

Numerous studies have shown that health communication, including health warnings, should incorporate fear appeals to increase negative emotions in order to be considered impactful (Clarke et al., 2020; Clarke, Pechey, et al., 2021; Gallopel-Morvan et al.,

2011; Hall et al., 2020; Ten Hoor et al., 2012; Kees et al., 2010; Muñoz et al., 2010; Morgenstern et al., 2021; Pechey et al., 2020; Piper et al., 2021; Witte & Allen, 2000). The results reported here are consistent with the literature on health warnings demonstrating that alcohol ads with cancer warnings fit these criteria – regardless of whether the warning was text-only or included a shocking image as they led to higher negative emotions than alcohol ads with multiple-text health warnings.

Meta-analyses have shown that negative emotions is a key motivator of behavioural change across a range of health behaviours (Tannenbaum et al., 2015; Witte & Allen, 2000). Hence, some of the issues emerging from the study finding relate specifically to the fear appeals literature as the extended parallel process model [EPPM] suggests that the health message can either be accepted or rejected (Witte, 1992), with high self-efficacy more strongly associated with "danger control" than "fear control" processes (Popova, 2012). This thesis measured affective reactions, including fear, worry, and anger, with anger more commonly used to define message rejection (Hall et al., 2016, 2017, 2020). As the mean for the self-efficacy items was generally high, with a score > 5, it seems unlikely that the participants responded to the health warnings defensively. Furthermore, descriptive statistics with respect to each negative emotions item indicated that participants were least likely to feel angry compared to worry and fear after exposure.

Next, compared to single warnings, exposure to multiple warnings was associated with lower negative emotions, indicating that the participants in this research did not perceive multiple-text health warnings as highly threatening compared to single-text health warnings. It may be that the lower recall scores of multiple-text warnings,

perhaps because of the increased cognitive processing effort required, may explain why they failed to increase negative emotions. Health warnings cannot be effective and persuasive, let alone change consumer behaviour if they are not properly encoded (Laughery & Wogalter, 2006). This study adds to the body of knowledge by experimentally examining the effects of multiple warnings on negative emotions. Given the lack of studies on the efficacy of multiple warnings and that the multiple warning condition included a group of text messages displayed simultaneously on both alcohol ads, it would seem more likely that multiple threats in the format of multiple text messages would mean a higher level of threat (fear), which should ultimately lead to higher negative emotions. Given this, the lack of significant differences between single-text and image-and-text health warnings may be explained by the image itself as previous research on health warnings in tobacco advertising distinguished between moderate and high fear images, with findings suggesting no significant differences between single-text warnings,with and without a moderate image, on negative emotions (Davis & Burton, 2006). Similar conclusions about the specific use of images have also been provided in a recent study on alcohol product warnings (Morgenstern et al., 2021).

Although it is arguable what constitutes “moderate” fear appeal and “high” fear appeal, more severe images in terms of the health risks they portray, may be associated with higher levels of fear, compared to imagery illustrating a moderate level of fear (Davis & Burton, 2016). The literature needs to be more consolidated in determining what level of fear is high, moderate, or low, as existing studies on fear appeals are inconsistent in defining what constitutes a sufficient level of fear arousal (Tannenbaum et al., 2015), and this difficulty also existed in the current study.

7.4.4 Perceived Personal Risks of Alcohol Use, Knowledge of Alcohol Health Effects and Self-efficacy to Drink Less

It is noted that there are a three notable null findings in this study, particularly the lack of significant effects for knowledge of alcohol-related harm, perceived risks of alcohol use, and self-efficacy to drink less. The results of this thesis highlight that the health warnings did not have an impact on these outcomes.

Perceived Risks of Alcohol Use. The findings of the current study are consistent with those of Niederdeppe et al. (2019), who found that both image-and-text and single-text health warnings in tobacco ads did not influence perceived risk beliefs of tobacco consumption. Lack of significant differences between conditions was found possibly due to the fact that the participants may not perceive alcohol consumption as harmful especially when compared to smoking or other addictive behaviours. The results reported here are also in line with experimental studies which did not find a significant impact of alcohol product health warnings on perceived risk beliefs (Clarke et al., 2021; Ma, 2021; Wigg & Stafford, 2016).

Knowledge. As knowledge of the health effects of alcohol did not differ between the experimental and control groups, the curent finding is similar to those recently reported by Gold et al. (2021) who investigated a cancer-focused warning in their large randomised control trial, with findings suggesting that a cancer health warning did not improve knowledge of the health effects of alcohol. On the other hand, Morgenstern et al.'s study compared single-text and graphic-and-text health warnings but found non-significant differences between both formats on knowledge about the link between

alcohol and cancer, pregnancy problems, and liver diseases. However, contrary to the findings reported here, a significant increase in knowledge was observed for those exposed to all health warnings (the experimental groups, irrespective of design) compared to those exposed to the control groups, without warnings (Morgenstern et al., 2021). One way to explain the null findings for both studies is that alcohol health risks about liver damage, pregnancy harm, addiction, and drink-driving issues may be alcohol harms that people already know (Jongenelis et al., 2018), thus reducing the possibility to find significance on knowledge of the health effects of alcohol.

Self-Efficacy. Comparatively little research has been conducted on self-efficacy to drink less but the non-significant results found here are inline with these reported by Ma (2021) and Hall et al. (2020) who did not find significant differences between the experimental conditions on this outcome in their studies on alcohol product health warnings. This general finding may also be attributed to the high self-efficacy scores found in the sample. It may be that the pariticipants believed that they have the confidence and ability to reduce drinking and showed a high level of self-efficacy, which may explain why the health warnings tested here did not lead to main effects on self-efficacy to drink less.

As self-efficacy refers to two dimensions which are cognitive and behavioural (McCarthy & Newcomb, 1992), it may also be that while people believe the health risks associated with a particular behaviour, they do not think these can happen to them and are unwilling to change their behaviour (Snipes et al., 1999). Furthermore, individuals may also make judgements and decisions based on peripheral (and heuristic) cues (Petty

& Caccioppo, 1984) where one's positive experiences towards drinking can explain the lack of significant effects on self-efficacy to drink less.

A further explanation for the null findings is that one-off exposure to health warnings, regardless of context, is unable to influence knowledge, risk perceptions and self-efficacy in contrast to repeated exposure (Ma 2021; Noar, Hall, et al., 2016; Francis et al., 2017) and even well-designed health warnings can fail to influence some precursors to consumer behaviour due to preexisting attitudes and beliefs, which is consistent with the communication human processing model [C-HIP] (Laughery & Wogalter, 2006). Therefore, the implications here appear to be rather methodological in nature, as longitudinal studies of tobacco health warnings reported changes in knowledge and perceived risks of tobacco consumption over time (e.g., Noar, Francis, et al., 2016; Thrasher et al., 2019). Similarly, studies of health warnings on alcohol products which found positive associations between exposure to health warnings and knowledge of alcohol-related harm were conducted in naturalistic settings with two stages of data collection (e.g., Hobin et al., 2020; Weerasinghe et al., 2020). From this study's findings, it appears that these constructs should be assessed longitudinally, and the methodological limitations of experimental designs are arguably evident.

7.4.5 Social Imagery Versus Product-Only Alcohol Ads

A debate within the literature relates to the content of alcohol advertising and the efficacy of health warnings. Although previous studies have examined the role of alcohol ad content and health warnings in France (e.g., Dossou et al., 2017, 2020; Diouf & Gallopel-Morvan, 2020) and the United States (Lou & Alhabash, 2021; Noel, 2021;

Noel & Lakhan, 2021; MacKinnon & Lapin, 1988), there are no studies that have compared alcohol ads with social cues featuring people drinking alcohol in a social setting against the same ads without people. This research found no differences between warning designs based on the content of alcohol ads, demonstrating that the use of social cues in alcohol ads did not decrease the impact of health warnings on any of the outcomes examined. Similarly, Noel and Lakhan (2021), in their study on warning labels in social media alcohol advertising, concluded that health warnings can counter the persuasive influence of alcohol advertising. The current finding is also consistent with a study conducted by Niederdeppe et al. (2019), who tested tobacco advertising health warnings similar in size, content, and position to the warnings tested in this research, with findings suggesting no evidence that the content of tobacco ads (with social cues—the presence of people) moderates the effects of health warnings. Similarly, it may be that the prominent (tobacco-style) health warnings tested in this research decreased the positive appeal of the alcohol ads.

In the context of the elaboration likelihood model [ELM], this finding suggests that the addition of peripheral cues, such as social cues in alcohol ads (e.g., people drinking alcohol in a social setting), did not hinder the central processing of the health warnings themselves and did not affect their persuasion, especially as levels of message elaboration depend on both the central and peripheral cues (Petty et al., 1983). The findings of this study support the ELM in a way that prominent alcohol advertising health warnings seem to act as central cues, implying that the design features of health warnings eliminated the peripheral cues, which has led to the lack of interaction effects between both factors in the main statistical models. One key explanation is that the current study tested larger health warnings, and the same findings may not resonate with

smaller health warnings. This confirms arguments raised by some researchers on the importance of well-designed health warnings when embedded in ads (e.g., Barlow & Wogalter, 1991; Krugman et al., 1994; Stark et al., 2008).

Furthermore, what stands out in the literature is the need for more data to explain the circumstances under which ad content moderates the impact of health warnings. Studies on advertising health warnings (whether in the domain of alcohol or not) also require a more synchronised approach in deciding the content of ads and warning designs to be tested, with a clear rationale in terms of the experimental stimuli. A greater focus on the actual design of experiments is needed as the limited literature in this area is subject to some methodological flaws (e.g., Effertz et al., 2013; Mays et al., 2016; Strasser et al., 2012). This thesis extends previous work as it provided a clear rationale as to why an ad with social cues was adopted in the experimental manipulation and ensured that the study would have a high internal validity.

7.4.6 Individual-Level Differences - Demographics

Research Proposition 3 was based on previous research suggesting that an understanding of individual-level characteristics in the context of behavioural change is important in health communication research (Stautz & Marteau, 2016), alcohol advertising (Brown et al., 2016) and that individual-level differences can moderate the efficacy of health warnings for tobacco (Hammond, 2011) and alcohol products (Dimova & Mitchell, 2021). However, this proposition was not supported and the findings from health warnings studies based on alcohol products appear to be mixed. In contrast to the null findings reported here, some studies found differences between

lower-risk drinkers and higher-risk drinkers with lower-risk drinkers more likely to support the inclusion of health warnings on product labels (Coomber et al., 2018) and were with more positive cognitive and behavioural reactions to health warnings on alcohol products (Andrews et al., 1990, 1991; Jones et al., 2022; Miller et al., 2016). In addition, real-world evaluations on the US government warning found that labels awareness and recall were higher for heavy drinkers, pregnant women and young people (e.g., Greenfield, 1992; Kaskutas & Greenfield, 1992). While previous research on health warnings have been found to support the role of demographics (Andrews et al., 1990, 1991; Dimova & Mitchell. 2021; Jones et al., 2022; Mazis et al., 1999; Miller et al., 2016; Winstock et al., 2020), the results reported in this thesis are consistent with other studies that did not find significant differences (Jongenelis et al., 2018; Hobin et al., 2020).

Gender differences for health warning effects were also documented with men less likely to believe in the risks associated with alcohol use during pregnancy (MacKinnon et al., 1995), and women more likely to think that drinking is harmful compared to men (Mazis et al., 1991) as well as more likely to support the inclusion of health information on warning labels (Coomber et al., 2018) and more willing to decrease their alcohol consumption as a result of seeing cancer warning statements (Winstock et al., 2020). While the current study does not provide evidence for significant differences between men and women on their cognitive and affective reactions, it does highlight that gender was a significant predictor of health warnings recall. This finding could also be attributed to women having a greater self-efficacy to drink less than men in this sample as the theory of fear appeals suggests that health communication is more effective for people with high self-efficacy (Witte et al., 1992). Thus it appears that the health

warnings tested here were of interest to women, which is in line with previous studies in the context of tobacco packaging (Hammond et al., 2012) and alcohol packaging (Jones et al., 2022). Furthermore, two other studies examining alcohol product warnings both found that women were more receptive to cancer warning statements than men (Miller et al., 2016) and were more responsive to and aware of health warnings after the US Act on alcohol labelling was enforced (Mazis et al., 1991).

Finally, demographic characteristics in fear appeal theories are not considered a significant factor in the effectiveness of fear appeal campaigns (Popova, 2012; Witte & Allen, 2000) and although the findings here do not imply that health warnings in alcohol ads moderate the effectiveness of health warnings, the lack of interaction effects could be attributed to the sample characteristics with studies focusing on non-university samples leading to different conclusions.

7.5 Research Limitations

The current findings should be considered within the context of several limitations. From these limitations, avenues for future research are then proposed.

First, the single focus of the study is on health warning designs, and not on the influence of alcohol ad content and advertising-related outcomes, thus the full potential impact of Section 13 has not been fully explored. Second, the control groups included alcohol ads with no warnings, and the participants who were exposed to the control conditions did not answer questions on the believability of alcohol advertising warnings and their negative emotions. It could have been more beneficial if viewers in the control

conditions had been exposed to alcohol ads with responsibility (self-regulatory) messages rather than no warnings at all. This would have allowed another comparison between control and experimental groups on negative emotions and would have strengthened the experimental design. Third, this research is limited to a single-exposure to alcohol ads with health warnings, and the findings reported here do not reflect consumer reactions to health warnings in alcohol ads based on repeated exposure in a real setting.

Another limitation is the single (mock) brand used in this research. Although creating an entirely new brand is important in increasing the internal validity of the experimental study and is viewed as a methodological strength (Geuens & De Pelsmacker, 2017), the findings here do not reflect consumers' cognitive and affective reactions to health warnings featured on ads promoting well-established alcohol brands. As such the study is unable to provide clarity on consumer cognitive and affective reactions to health warnings featured on well-known Irish brands. Not knowing individual preferences by beverage type is another key limitation in this thesis, as the study focused on one product (beer) and not other beverage types including spirits and wine. Therefore, it was not possible to determine variations in consumer reactions to health warnings based on different brands and product categories.

This research is also limited to two aspects of health warning designs – the number of warnings (single vs. multiple) and the presence or absence of a shocking image. However, many other aspects of warning designs can be manipulated, including colours, specific versus generic texts, pictograms, position, and size. While more design features were considered for manipulation by the author, it was unwieldy to include

more design characteristics for comparison in one factorial survey experiment, as including more conditions unnecessarily increases the complexity of the study (Martin, 2008).

Other limitations relate to the survey questions. For instance, the variable recall was measured qualitatively, and the participant responses were analysed based on the researcher's subjective judgement. How recall was operationalised is presented in Chapter 5 and more desciriptive information about the coding decisions is available in Chapter 6. Efforts were made to reduce bias by following the coding process for recall in keeping with research on health warnings (e.g., King et al., 2020). To avoid selecting information based on personal opinion or pre-existing attitudes toward the topic, 100 cases were reviewed by another researcher for this purpose. Most previous research involving health warnings measured this variable qualitatively—either by the researchers themselves or by hiring independent research assistants (e.g., Mays et al., 2016, 2019; Stark et al., 2008; Strasser et al., 2012; Truitt et al., 2002; Wackowski et al., 2019).

Other limitations relate to the sampling charactersitics. Probability sampling methods were not used in the recruitment process and the research participants in this thesis were recruited based on convenience; thus the study sample is not representative of Irish adults in Ireland, limiting the generalisation of the findings. A representative sample would have been beneficial, particularly regarding alcohol policy contributions, and hiring a market research agency was considered in the initial data collection phase but it was impossible to achieve this without sufficient funding. Finally, as the participant's engagement with the survey was not monitored, the likelihood of inaccurate and biased

responses in an online setting is possible. It could also be that some participants sensed the real purpose of the experimental study, which could have influenced the results.

7.6 Recommendations for Further Research

Based on the limitations, suggestions for further research are proposed next. As this is the first study to test single and multiple health warnings in alcohol ads, it offers many opportunities for further research.

7.6.1 Methodological Recommendations

The key strength of the current study is the experimental design involving randomisation and the ability to determine causal effects between variables. While experimental studies are a preferred methodological choice for evaluating warning designs before examining their impact in the real world (Kokole et al., 2021), it would be beneficial to examine the impact of alcohol advertising health warnings on consumer behaviour longitudinally over time—preferably after the commencement of Section 13 of the PHAA.

It may also be worth exploring further whether the recommended health warnings by the PHAA will be considered influential in modifying drinking behaviour. Qualitative methods would allow for a more in-depth exploration of consumer perceptions regarding the warning designs themselves and the role of alcohol ads in the process. Qualitative studies (as a follow-up from the findings reported here) could also shed light on whether cancer warnings in alcohol ads (with and without social imagery) induce

fear (negative emotions) or reactance. It is interesting to determine whether contexts matter with respect to fear appears and health warnings (e.g., warnings on products vs. warnings in alcohol ads).

The study results have also indicated that different groups did not have different perceptions and responses to health warnings in alcohol ads. Future research should examine other relevant moderators such as whether consumer's education level and social status have an effect on how health warnings are being evaluated.

7.6.2 A Range of Health Warning Designs

There are also a number of areas of potential research related to the design of health warnings.

Multiple Warnings. As this study found its particular combination of multiple-text health warnings to be less effective than single-text warnings, other possible combinations of multiple-text messages warrant further comparison.

Shocking Images. As this research did not find significant differences between single-text with and without an image, further experimental research needs to compare if this finding holds with other images and cancer-focused text health warnings so that it could be determined under which conditions text-based health warnings are superior, if any. In addition, there is a need to test if pictograms-icons or shocking images are more effective on individuals' cognitive and affective reactions and how would they be perceived when embedded in alcohol advertisements.

Health Warnings Size. Although the current study tested health warnings occupying 20% of the ad space, it did not manipulate the warning size as part of the survey experiment. Further research needs to consider whether size moderates the effectiveness of health warnings in alcohol ads. Additional research could extend this work in testing warning sizes both larger and smaller than 20%.

7.6.3 Greater Focus on Alcohol Advertising

The current work could potentially be replicated by examining consumer reactions to multiple and cancer-focused health warnings in the context of well-established alcohol brands by also examining a number of brand and ad-related outcomes to address the second component of Section 13 concerning ad content restrictions. Health warnings displayed on other product categories (in alcohol ads) should also be examined. This study found that ads with social imagery (the presence of people) did not decrease the impact of health warnings. One way to extend the current finding is through another factorial experiment focusing on alcohol ads (with and without the presence of people) with health warnings sized at 10% versus 20% and 40% of the ad space, as such experimental comparison will indicate under which conditions alcohol ad content is more impactful and whether it is the size of the warning in this study that undermined the effect of alcohol ads with social imagery.

The findings reported in this thesis also highlight the need to identify other relevant factors or strategies that can distract viewers away from the content of alcohol ads. In this regard, it may be helpful to conduct another experiment with health warnings comparing product categories, including beer, spirits, or wine, and determine if health

warnings in ads should be modified according to the alcohol product advertised. In addition, this thesis did not consider the impact of particular media channels (e.g., traditional or digital; e.g., Noel & Lakhan, 2021) through which health warnings can be communicated, which is another interesting area for future research.

7.7 Practical Implications for Alcohol Health Warnings Policy

This section addresses alcohol regulatory bodies in particular. Substantial evidence exists on product health warnings (see Chapter 2), and policy discussions have been primarily focused on alcohol product labelling (World Health Organization 2020, 2021). However, it is important that public health practitioners recognise other important channels to communicate health warnings, such as alcohol advertisements. Indeed, public health officials in Europe have begun to consider the potential impact of health warnings in alcohol ads, and a recent project for the European Commission is currently underway which surveyed policymakers, government bodies and researchers on their perceptions of the relevance and content of health warnings in alcohol ads (AlHaMBRA Project, 2022). The findings reported here advance some of these ongoing European policy discussions and provide guidance on how health warnings in alcohol ads can be communicated.

Section 13 of the PHAA requires a number of content-specific alcohol advertising warnings, and given the importance of this legislation, studies that offer some insights of the potential impact of multiple and cancer alcohol warnings on consumer reactions are pressing issues of critical importance. Policymakers may use the findings from the current research, which provide information on the potential impact of multiple health

warnings in alcohol ads on consumer cognitive and affective reactions. More specifically, the findings reported here provide useful insights for the design of health warnings, suggesting that single-text health warnings depicting eight different fatal cancers increased participants' negative emotions whereas multiple-text health warnings had less impact in general. It appears that the downside of using a group of warnings simultaneously in alcohol ads is that the greater the number of warnings (e.g., the amount of textual information), the less likely they are to be recalled and considered effective. Furthermore, the current study tested multiple-text warnings occupying 20% of the advertisement space and given that the size requirements for multiple warnings in alcohol ads will likely be less than 20% of the ad space, the likelihood that multiple warnings can be more effective than single warnings decreases further.

Notwithstanding the requirement of multiple-text warnings as part of the PHAA, the current study offers evidence that using single health warnings, particularly related to cancer, is more effective, and policymakers should focus their efforts on designing warnings that lead to emotional effects. As cancer health warnings, however, were found less believable compared to multiple warnings, there is an urgent need to educate people on the cancer risk profile of alcohol consumption and increase individuals' propensity to believe warnings and the link between alcohol and fatal cancers. One way to do that is through cancer health warnings, and as such, out of the four multiple warnings proposed by the Act, the implementation of a single cancer warning, in particular, may be more beneficial given that the believability of cancer warnings will increase over time via repeated exposure. Therefore, one way to communicate the risk of alcohol consumption with fatal cancers is via cancer warnings in alcohol advertisements (and not just on product labels), as if more people believe the the

alcohol-cancer link on a population-based level, decreases in consumption are likely to occur.

While the role of health warning designs was the major focus in this research, the study did consider whether the use of social imagery (e.g., the presence of people enjoying alcohol in a social setting) decreases the impact of health warnings. It was found that alcohol ads with social imagery did not decrease the effects of health warnings, which could be attributed to the fact that the warnings occupied a larger surface area, and efforts should be directed to the design of warnings so that they can better compete with promotional marketing elements. As this research did not measure impact on brand salience or perceived ad attractiveness, the results reported here should be interpreted with caution as the study did not examine content restrictions per se and the impact of content restrictions as another component of Section 13 of the PHAA was not evaluated. However, although social imagery alcohol ads did not moderate the efficacy of health warnings, it may be that the use of people in alcohol ads will decrease the possibility of making health warnings more normative and believable, much in the same way tobacco warnings are more believable and noticeable on cigarette plain packages than branded packages (Drovandi et al., 2019; Moodie et al., 2011).

Furthermore, the current study did not find differences of consumer cognitive and affective reactions based on age, gender, and drinking status. The lack of interaction by demographics suggests that health warnings in alcohol ads can have a wider effect across demographic groups. While a review of the existing literature wold suggest mixed support for the moderating role of demographics, this study suggests that the lack

of moderating effects increases the change of warnings efficacy at the population level and that health warnings will be equally effective across different demographic groups.

In closing, well-designed warnings in alcohol advertisements can be an effective component of the already existing policy measures to control the harm of alcohol consumption in the country. The findings presented here offer insight for alcohol policy officials in other countries and could guide the development of health warning designs for alcohol products and not just advertising. Policymakers and researchers should work together to further investigate the impact of different types of health warnings on cognitive and affective reactions in order to set out the most effective regulations on health warnings use.

7.8 Reflexivity Section

I started off this PhD on the topic How and When Alcohol Marketing Influences Drinking Intentions, with a particular focus on social norms as an explanatory pathway. There were two proposed phases for this research – an initial qualitative investigation, approved and completed in December 2018, and a quantitatve phase with a survey experiment focusing on the influence of likes, shares, and comments in the context of social media alcohol marketing.

It took me two years of reading on this topic, completing several literature drafts on alcohol marketing and passing two annual evaluations to only realise that my research hypotheses got published by another researcher. More specifically, the paper “Alcohol advertising on Facebook and the Desire to Drink Among Young Adults” by Noel and

Babor (2018) reflects the hypotheses I had prepared for testing. Alcohol marketing was an attractive topic to me and this was dissapointing situation for a PhD student who completed their first 2 years of the programme of study. Due to worldwide changes in the policy landscape in Ireland, I shifted my research focus to **health warnings** in alcohol advertising. I considered series of survey experiments focusing on health warning designs, alcohol advertising content characteristics (e.g., levels of imagery), beverage categories, and potential for social norms overlaid/incorporated with comments and likes modified/varied.

While I designed some experimental stimuli for some subsequent experiments (e.g., health warnings sized at 20% vs. 40%), I came to realise that it was not possible to conduct another study with university students from TU Dublin, as those who participated in the first experiment, were debriefed on the real purpose of the study. As such, second data collection stage using the same pool of participants was compromised. As stated in the thesis, data collection started at the time the first lockdown was imposed in the country and the researcher became under significant pressure to complete the initial survey experiment as soon as possible, particularly due to the Covid-19 pandemic.

One thing that I have learned for certain is that designing experiments is a lengthy process, and while a second attempt for data collection (outside TU Dublin) was made, the response rate was 0%, perhaps due to the Covid-19 restrictions during this time in the country. Many things could have been achieved with more funding. It is noted that as TU Dublin did not have a license for the Qualtrics software, I had to pay 1500e to collect data using randomisation. In addition, I spent approximately 2500e personal

funds for a graphic designer and have realised that the overall methodology plan demanded more resources, funding, and time.

Also, I made a key mistake with the selection of measurement scales (and of course many small mistakes) during the years. The first issue was my insistence to use the AUDIT-C scale rather than another tool for measuring alcohol consumption. AUDIT-C was attractive to me in that it was studied by many researchers in alcohol marketing and health warnings. However, I should have used the term “standard drinks” rather than “units” for analysis. By using units I deviated from standard practice and the confusion around standard drinks and units was very dissapointing. However, recognising limitations to doing research is very important and this PhD jorney has been a learning curve for me.

Finally, I am certain that if I did not alter my research focus, I would have reported more than a single study in this thesis. Furthermore, I did not expect I would have difficulties in recruiting participants and I was over-ambitious in my attempt to conduct the “perfect” experiments when in reality no research is really perfect. If starting this thesis again, I would include a second study focusing on ad content restrictions and a third study which would include health warning designs by beverage type. By doing so, the research methodology would be more solid with certainly more contributions to alcohol policy. After completing this thesis, I feel like I am still trying to climb a cliff, hoping now it’s a new cliff - with new research possibilities.

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APPENDICES

Appendix A: Email Invite for Participation in the Survey

Subject line: Research request from Vania Filipova, School of Marketing.

Dear all,

This survey is part of an academic research project by Vania Filipova, who is a Doctoral Researcher in TU Dublin.

In the survey, you will be asked to view an alcohol advertisement and fill out a set of questions about your drinking behaviour and health.

Completing the survey should take no more than 10 minutes of your time and is available at https://tudublin.fra1.qualtrics.com/jfe/form/SV_5prnhByrB3yDX2R

In return for your participation, you will be entered into a prize draw for the chance to win a pair of SONY WH-CH510 Wireless Bluetooth On-Ear HeadPhones. Your input is greatly appreciated!

Appendix B: Web Survey Flow on Qualtrics

Standard: Introduction and Consent
Standard: AUDIT-C
Standard: Health attitudes-related questions

Block Randomizer: 1 - Evenly Present Elements

Block: Group 3 Single-text HW on product only alcohol ad
Block: Group 4 Single-text HW on social imagery alcohol ad
Block: Group 5 Image-text on product only alcohol ad
Block: Group 6 Image-text on social Imagery alcohol ad
Block: Group 7 Multiple-text on product only alcohol ad
Block: Group 8 Multiple-text on social imagery alcohol ad
Block: Control 1 Ad content social imagery
Block: Control 2 Ad Content product only

Branch: New Branch
If
If You are now viewing an alcohol advertisement and afterwards you will be required to answer a numb... Is Not Displayed
And You are now viewing an alcohol advertisement and afterwards you will be required to answer a numb... Is Not Displayed

Standard: Negative Emotions
Block: Health warning recall
Block: HW believability conditional questions

Branch: New Branch
If
If frequency of drinking prior to Covid Never Is Selected

Block: Knowledge of the health effects of alcohol
Block: Demographics
Block: Final

End Survey:

Block: Knowledge, Perceived Risks (2 Questions)
Standard: Self-efficacy
Block: Demographics
Block: Final

End Survey:

Page Break

Appendix C: Web Survey, Information, Consent and Debrief.

This appendix presents the survey experiment as completed by the research participants on Qualtrics. It is of note that the survey involves two questions which were not included in the main analysis and which are classified as "distracting" questions (Questions 4 and 5). Given the nature of experimental research in terms of consent and debriefing procedures (Kirk, 1995), this was deemed necessary as the participants were told that the purpose of the study was to measure their alcohol consumption and health rather than the effectiveness of health warnings in alcohol ads – the real purpose of the study.

Start of Block: Introduction and Consent

This survey is part of an academic research project by Vania Filipova, who is a Doctoral Researcher in TU Dublin. In the survey, you will be asked to view an alcohol advertisement and fill out a set of questions about your drinking behaviour and health.

Completing the survey should take no more than 10 minutes of your time and your input is greatly appreciated.

In return for your participation, you will be entered into a prize draw for the chance to win a pair of SONY WH-CH510 Wireless Bluetooth NFCC On-Ear Head Phones. Please answer all questions in order to enter the draw.

Will taking part in this study be kept confidential?

Data will remain confidential and will be securely stored and protected with accordance with Technological University Dublin research ethics.

Are you eligible to take part?

You should be aged 18 or older in order to take part.

What will happen if you volunteer?

It is up to you to decide whether or not to take part. You are free to end your

participation at any time and without needing to give any reason; this applies even if you have already started the survey.

What would happen to the results of the research study?

When the study has been completed, the collected data will be analysed and included in Vania Filipova's doctoral dissertation. The results could also be reported in an appropriate scientific journal or presented at a conference. Your identity would not be revealed in any way and if you would like a copy of the dissertation, you may request this. You may contact Vania by sending an email to Vania.Filipova@tudublin.ie

Page Break

By clicking the button below, you acknowledge that:
You understand the purpose of the study.
You understand and acknowledge that the investigation is designed to promote scientific knowledge.
Your participation in the study is voluntary.
You are 18 years of age or older.
You are aware that you may choose to terminate your participation in the study at any time and for any reason.

- ○ I do consent, I wish to participate (1)
- ○ I do not consent, I do not wish to participate (2)

Skip To: End of Survey If By clicking the button below, you acknowledge that: You understand the purpose of the study. Yo... = I do not consent, I do not wish to participate

Page Break

End of Block: Introduction and Consent

Start of Block: AUDIT-C

Q1 Thinking about your drinking behaviour **PRIOR** to the COVID-19 lockdown, how often on average do you have a drink containing alcohol?

- ○ Never (1)
- ○ Monthly or less (2)
- ○ 2-4 times a month (3)
- ○ 2-4 times a week (4)
- ○ 4 or more times a week (5)

Skip To: End of Block If frequency of drinking prior to Covid = Never

The following questions ask about your alcohol use **PRIOR to the COVID-19 lockdown.** Please select the answer that is correct for you. To answer each question, please consider that one unit of alcohol (i.e.,1 pint of beer/cider or a regular glass of wine) is the equivalent of two drinks.
Examples for 1 unit of alcohol:

Page Break

X→ X→

Q2 Thinking about your drinking behaviour **PRIOR to the COVID-19 lockdown,** how many units of alcohol do you have on a typical drinking occasion? Examples for 1 unit of alcohol:

- ○ 1-2 (1)
- ○ 3-4 (2)
- ○ 5-6 (3)
- ○ 7-9 (4)
- ○ 10 or more (5)

Page Break

Q3 Thinking about your drinking behaviour **PRIOR to the COVID-19 lockdown,** how often do you have **6 or more units** on a typical drinking occasion? Examples for 1 unit of alcohol:

- ○ Never (1)
- ○ Less than monthly (2)
- ○ Monthly (3)
- ○ Weekly (4)
- ○ Daily (5)
- ○ Almost Daily (6)

End of Block: AUDIT-C

Start of Block: Health-related questions (distractors)

Q4 Please select the option which best represents your attitudes about each of the following statements:

	Strongly disagree (1)	(2)	(3)	(4)	(5)	(6)	Strongly agree (7)
I reflect about my health a lot (1)	○	○	○	○	○	○	○
I'm very self-conscious about my health (2)	○	○	○	○	○	○	○
I'm alert to changes in my health (3)	○	○	○	○	○	○	○
I'm usually aware of my health (4)	○	○	○	○	○	○	○
I take responsibility for the state of my health (5)	○	○	○	○	○	○	○
I'm aware of the state of my health as I go through the day (6)	○	○	○	○	○	○	○

Page Break

Q5 Has a close family member (i.e. spouse, parent, or sibling) been diagnosed with any of these health conditions?

	Yes (1)	No (2)	I don't know (3)	Prefer not to answer (4)
Cancer (1)	○	○	○	○
Mental health problems (2)	○	○	○	○
Addictions (i.e. alcohol and other substances) (3)	○	○	○	○
Serious liver disease(s) (4)	○	○	○	○

Page Break

End of Block: Health-related questions (distractors)

Start of Block: Single-text HW on product only alcohol ad

Ad C You are now viewing an alcohol advertisement and afterwards you will be required to answer a number of questions. Please click through to the next section when you are ready.

End of Block: Single-text HW on product only alcohol ad

Start of Block: Single-text HW text on social imagery alcohol ad

AD D You are now viewing an alcohol advertisement and afterwards you will be required to answer a number of questions. Please click through to the next section when you are ready.

End of Block: Single-text HW text on social imagery alcohol ad

Start of Block: Image-text HW on product only alcohol ad

AD E You are now viewing an alcohol advertisement and afterwards you will be required to answer a number of questions. Please click through to the next section when you are ready.

End of Block: Image-text HW on product only alcohol ad

Start of Block: Image-text HW on social Imagery alcohol ad

AD F You are now viewing an alcohol advertisement and afterwards you will be required to answer a number of questions. Please click through to the next section when you are ready.

End of Block: Image-text HW on social imagery alcohol ad

Start of Block: Multiple-text HW on product only alcohol ad

AD G You are now viewing an alcohol advertisement and afterwards you will be required to answer a number of questions. Please click through to the next section when you are ready.

End of Block: Multiple-text on product only alcohol ad

Start of Block: Multiple-text on social imagery alcohol ad

AD H You are now viewing an alcohol advertisement and afterwards you will be required to answer a number of questions. Please click through to the next section when you are ready.

End of Block: Multiple-text on social imagery alcohol ad

Start of Block: Control 1 an alcohol ad with social imagery (no HW)

AD B You are now viewing an alcohol advertisement and afterwards you will be required to answer a number of questions. Please click through to the next section when you are ready.

End of Block: Control 1 an alcohol ad with social imagery (No HW)

Start of Block: Control 2 an alcohol with the product only (No HW)

Ad A You are now viewing an alcohol advertisement and afterwards you will be required to answer a number of questions. Please click through to the next section when you are ready.

End of Block: Control 2 an alcohol ad with the product only (No HW)

Start of Block: Negative Emotions

Q6 Thinking about the advertisement you just viewed, how did you feel while viewing it?

	Not at all (1)	A little (2)	Moderately (3)	Quite a bit (4)	A lot (5)
Angry (1)	○	○	○	○	○
Scared (2)	○	○	○	○	○
Worried (3)	○	○	○	○	○

End of Block: Negative Emotions

Start of Block: Health warning recall

Q7 Based on the ad you just viewed, please try to recall what the **warning label** read:

_____

End of Block: Health warning recall

Start of Block: HW believability conditional questions

X→

Q8 Please think about the health warning(s) displayed on the alcohol advertisement you just viewed.

	Not at all believable (1)	(2)	(3)	(4)	(5)	(6)	Very believable (7)
How believable did you find the health warning(s)? (1)	○	○	○	○	○	○	○

X→

Q9 Please think about the health warning(s) displayed on the alcohol advertisement you just viewed.

	Not all convincing (1)	(2)	(3)	(4)	(5)	(6)	Very convincing (7)
How convincing did you find the health warning? (1)	○	○	○	○	○	○	○

End of Block: HW believability conditional questions

Start of Block: Knowledge, Perceived Risks

Q10 The following is a list of health effects and diseases that may or may not be caused by drinking alcohol. Based on what you know or believe, please provide your level of agreement with each statement:

	Strongly disagree (1)	(2)	(3)	(4)	(5)	(6)	Strongly agree (7)
Alcohol can cause mental health problems (1)	○	○	○	○	○	○	○
Alcohol can be addictive (2)	○	○	○	○	○	○	○
Drinking alcohol when pregnant harms the unborn baby (3)	○	○	○	○	○	○	○
Alcohol can cause cancer of the mouth, pharynx, larynx, oesophagus, liver, pancreas, bowel and breast (4)	○	○	○	○	○	○	○
Drinking impairs ability to operate machinery (5)	○	○	○	○	○	○	○
Alcohol can cause liver disease(s) (6)	○	○	○	○	○	○	○

Display This Question:

If frequency of drinking prior to Covid != Never

Q11 Please read the following statements and provide your level of agreement with each statement:

	Strongly disagree (1)	(2)	(3)	(4)	(5)	(6)	Strongly agree (7)
Alcohol consumption has damaged my health (1)	○	○	○	○	○	○	○
I am worried that drinking will damage my health in the future (2)	○	○	○	○	○	○	○
Drinking alcohol has lowered my quality of life (3)	○	○	○	○	○	○	○
I am worried that drinking alcohol may lower my quality of life in the future (4)	○	○	○	○	○	○	○

End of Block: Knowledge, Perceived Risks

Start of Block: Self-efficacy

Q12 Please read the following questions and select the appropriate response:

	Not at all confident (1)	(2)	(3)	(4)	(5)	(6)	Very confident (7)
Overall, how confident are you that you can reduce your drinking right now? (3)	○	○	○	○	○	○	○

Q13 Please indicate whether:

	Very difficult (1)	(2)	(3)	(4)	(5)	(6)	Very easy (7)
Cutting down on the number of alcohol units that you drink in the next week would be: (3)	○	○	○	○	○	○	○

End of Block: Self-efficacy

Start of Block: Demographics

Q14 Please specify your gender:

- ○ Male (1)
- ○ Female (2)
- ○ Prefer not to say (3)
- ○ Other: Please specify (4) _____

Q15 What is your age?

_____

Q16 What is your nationality?

- ○ Irish citizen (1)
- ○ Non-Irish citizen (2)

End of Block: Demographics

Start of Block: Final

Email address: To enter the draw for SONY WH-CH500 Wireless Bluetooth NFCC On-Ear Headphones, please fill in your email address in the box below. Please note this is NOT compulsory. Your email address will only be used for the purposes of entering the prize draw.

_____

End of Block: Final

Debrief

Thank you for participating in my survey experiment!

The nature of the phenomenon I'm investigating required minor deception on my part. The real purpose of the study is to examine the effectiveness of alcohol advertising health warnings on consumers' perceptions about risks, knowledge of the health effects of alcohol as well as recall and believability of health warnings. Central to this research context is the Public Health (Alcohol) Act 2018, particularly Sect.13 of the Act, which requires four health warnings in all alcohol ads and aims to restrict advertising content. In line with this, you were exposed to either the presence (or absence) of new and content-specific health warnings(s) displayed on two types of alcohol advertisements.

If you have any questions regarding this study, please feel free to e-mail me on Vania.Filipova@tudublin.ie tel. 0838307652

I urge you not to discuss this study with anyone else who is currently participating or might participate at a future point in time.

Finally, please see below some more information, which you may find useful.

The risk from alcohol increases in line with how much you drink and it is important to understand the impact of alcohol consumption on our health and how much alcohol is considered to be low-risk, so you can make an informed decision about your drinking.

What is a standard drink?

- A pub measure of spirits (35.5ml)
- A small glass of wine (12.5% volume)
- A half pint of normal beer
- An alcopop (275ml bottle)

A bottle of wine at 12.5% alcohol contains about seven standard drinks.

What are the low-risk drinking guidelines?

Low-risk weekly guidelines for adults are:

- up to 11 standard drinks in a week for women.
- up to 17 standard drinks in a week for men.

For more information, please visit: www.askaboutalcohol.ie www.alcoholaction.ie www.hse.ie

Further Reading:

Argo, Jennifer J., and Kelley J. Main. "Meta-Analyses of the Effectiveness of Warning Labels." *Journal of Public Policy & Marketing* 23, no. 2 (2004): 193-208.

Al-hamdani M, Smith S. Alcohol warning label perceptions: Emerging evidence for alcohol policy. Canadian Journal of Public Health. 2015; 106(6).

Appendix D: TU Dublin Insurance Confirmation

From: insurance@dit.ie

Dear Vania,

Thank you for your email. I can confirm the DIT Public Liability policy will operate in respect of DIT's legal liability with regard to this research activity. You can attach this email to your online application as confirmation from the Office of the Institute Secretary.

Kind regards,

Alicia Beiro Magán
Office of the Institute Secretary
Dublin Institute of Technology
Park House Grangegorman
191 North Circular Road
Dublin 7 , D07 EWV4

Ph: 01 2205134

Appendix E: Missing Value Analysis

Scale items	*N*	*M*	*SD*	*Missing Percent*
Thinking about the advertisement you just viewed, how did you feel while viewing it? - Angry	627	1.55	0.933	0.0
Thinking about the advertisement you just viewed, how did you feel while viewing it? - Scared	627	1.81	1.031	0.0
Thinking about the advertisement you just viewed, how did you feel while viewing it? - Worried	627	1.99	1.082	0.0
How believable did you find the health warning(s)?	627	5.03	1.700	0.0
How convincing did you find the health warning?	627	4.00	1.854	0.0
Knowledge of alcohol risks - Alcohol can cause mental health problems	621	6.01	1.384	1.0
Knowledge of alcohol risks - Alcohol can be addictive	621	6.43	1.171	1.0
Knowledge of alcohol risks - Drinking alcohol when pregnant harms the unborn baby	621	6.47	1.191	1.0
Knowledge of alcohol risks - Alcohol can cause cancer of the mouth, pharynx, larynx, oesophagus, liver, pancreas, bowel, and breast	621	5.50	1.508	1.0
Knowledge of alcohol risks - Drinking impairs ability to operate machinery	621	6.64	1.083	1.0
Knowledge of alcohol risks - Alcohol can cause liver disease(s)	621	6.57	1.088	1.0
Risk perceptions - Alcohol consumption has damaged my health	618	2.66	1.733	1.4
Risk perceptions - I am worried that drinking will damage my health in the future	618	3.00	1.907	1.4
Risk perceptions - Drinking alcohol has lowered my quality of life	618	2.17	1.536	1.4
Risk perceptions - I am worried that drinking alcohol may lower my quality of life in the future	618	2.62	1.824	1.4
Self-efficacy to drink less: Overall, how confident are you that you can reduce your drinking right now?	618	6.17	1.364	1.4
Self-efficacy to drink less: Cutting down on the number of alcohol units that you drink in the next week would be:	618	6.12	1.421	1.4

Note. Little's MCAR test: Chi-square = 25.904, DF =16, p=.055

Appendix F: Intercorrelation Matrix

Correlations were calculated for all continuous variables of interest and are presented in Table I-1. The purpose of the analysis was to identify significant relationships among the variables and

Table F-1

Intercorrelation Matrix for Key Variables

Scale Item	*Min–Max*	*M*	*SE*	*SD*	*Skewness*	*Kurtosis*	1.	2.	3.	4.	5.
Negative emotions	1-5	1.79	0.03	0.83	1.10	0.75	(.73)				
Knowledge of alcohol effects	1-7	6.28	0.03	0.90	-3.11	13.43	.001	(.83)			
Self-efficacy to drink less	1-7	6.14	0.04	1.27	-1.66	2.22	.016	.166***	(.79)		
Believability of health warnings	1-7	4.50	0.06	1.60	-0.30	-0.59	.119**	.157***	.018	(.76)	
Perceived personal risks of alcohol use	1-7	2.64	0.05	1.48	0.80	-0.13	.257***	.099**	-.267***	.097*	(.86)

Note. Diagonal within brackets = Cronbach's α; *Min-Max* = minimal and maximal theoretical limits.

Appendix G: Alcohol Health Warnings in the United States

From Chapter 2, it is evident that much of the early findings with respect to health warnings on alcohol products came from the United States based on the real world effects of health warnings on alcohol consumption and precursors to consumer behaviour. This Appendix provides a summary of previous studies on alcohol product health warnings from the United States. Table S4 illustrates some of the primary studies evaluating the impact of health warnings legislated in 1989 in the United States for both alcohol products and advertisements, and presents literature on relevant constructs, including consumer cognitive, affective, and behavioural responses to alcohol health warnings. The studies included are qualitative and quantitative, with an experimental design as the most common method.

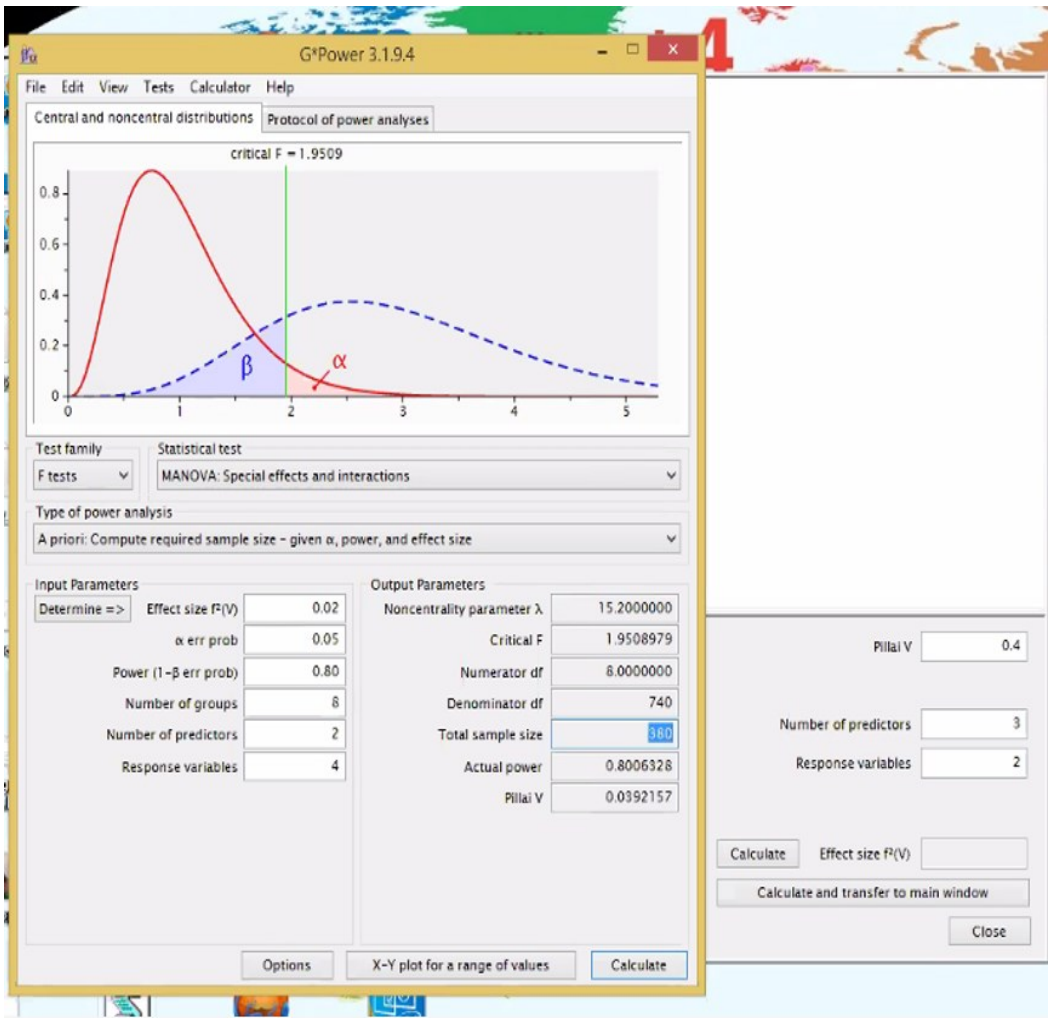
Table G1: Summary of studies on alcohol health warnings conducted in the United States

Author/year	Sample	Context	Method	Outcomes	Conclusion
Andrews et al. (1991)	University students (n=273)	Products	Cross-sectional	Perceived Believability Attitudes	Health warnings were found to be less believable by drinkers compared to non-drinkers. Pregnancy and drink-drive health warnings were significantly more believable than other health warnings such as "cancer" or "alcohol is addictive".
Barlow & Wogalter (1993)	University Students (n=225)	Advertising	Experimental	Recall/Memory Knowledge	More prominent health warnings in alcohol ads increased recall of the warnings themselves and knowledge of the health effects of alcohol.
Fox et al. (1998)	Adolescents (n=143)	Advertising	Eye-tracking Experimental	Attention to voluntary alcohol health warnings.	Voluntary health warnings on beer ads generated less attention compared to the mandated cigarette warning when displayed on adverts. The authors conclude that context is an essential factor when examining the effectiveness of health warnings.
Graves (1993)	Adults (n=2000)	Products	Cross-sectional national survey	Awareness	After exposure to the health warnings, awareness of alcohol product warnings increased by 27% among men, heavy drinkers, and young people.
Greenfield & Kaskutas (1992)	Adults (n=2000)	Products	Cross-sectional national survey	Risk perceptions Noticeability/recall of health warnings	High noticeability and recall of health warnings. The recall was greater for heavier drinkers. Participants were more likely to drink less and avoid operating machinery after consumption than participants who did not see the health warnings.
Hankin et al., (1993)	Adults, pregnant females (n=4397)	Products	Cross-sectional	Perceived risks Drinking behaviour	Higher awareness and recall were found of the US warning. Significant differences between light and heavy drinkers after exposure to pregnancy health warnings. Light drinkers were more likely to reduce drinking than heavy drinkers. The effect was small but statistically significant.
Kalsher et al., (1993)	Students (n=134)	Poster	Experimental	Knowledge of alcohol risks	Increased knowledge after exposure to alcohol warning posters, including less and well-known alcohol facts
Laughery et al., (1993)	Adults (n=147)	Products	Series of experiments	Health warnings noticeability	The current US health warnings were less noticeable, but enhanced design features such as pictorials, icons, and colour significantly improved noticeability.
Mackinnon, (1993)	Students (n=111)	Products	Experimental	Avoidance	Alternative health warnings designs, including specific wording, were more effective than the US health warnings.
Mackinnon	University students	Advertising	Experimental	Intentions to avoid	Gender and drinking status were associated with the dependent measures.

& Lapin, (1998)	(n=164)			alcohol Product benefits	After exposure to more prominent health warnings, there were increased avoidance responses to drinking, including strong wording such as “poison” and “cancer”.
MacKinnon et al., (2000)	Adolescents (n=16661) and (n=16856)	Products	Cross-sectional data were collected during 1989-1990 and 1994-1995	Awareness Exposure and memory Risk beliefs	An increase was recorded in warning awareness and memory. After three years, these effects wore off, suggesting that individuals get used to the warning presence, and the warning becomes no longer effective. There was no significant change in beliefs or alcohol consumption.
MacKinnon et al., (2001)	Adolescents (n=3165) Only (n = 649) participated in all three waves	Products	Longitudinal	Alcohol consumption Awareness	Increased awareness of warning labels, but no significant change was found in consumption. The effect on awareness was small.
MacKinnon et al., (1993)	Adolescents (n=1211) before the law and (n=1160) after the health warnings were introduced.	Products	Cross-sectional	Awareness Recall Beliefs	Higher awareness after exposure to the mandated US warning. Increased recall after exposure to the mandated US warning. Non-significance was found in beliefs about risks and levels of alcohol consumption.
Mackinnon et al., (1995)	University students (n=27,544)	Products	Cross-sectional	Perceived risks of alcohol use while pregnant Knowledge of the health effects of alcohol	82% of those surveyed believed that drinking alcohol while pregnant is risky. Compared to women and older participants, men and younger participants were less likely to believe that drinking is dangerous for pregnant women. A large proportion of those surveyed perceived alcohol consumption as less harmful if consumed in moderation.
Mazis et al., (1991)	Adults (n=2000)	Products	Cross-sectional National surveys in 1981, 1990, 1991.	Perceived risks of alcohol use Awareness	Higher awareness among young people and heavy drinkers. A modest increase in consumers’ perceived risk.
Nohre et al., (1999)	Adolescents (n =6,391)	Products	Cross-sectional	Awareness Perceived risk beliefs	Higher awareness; Greater recall; Only modest effect found between sociodemographics.

Appendix H: Power Calculation Analysis Using SPSS

It is of note that the visual representation of the power analysis indicates a sample of 380 with four outcome measures in mind (without self-efficacy and recall) in the context of MANOVA.



Appendix I: MANCOVA Model 1 Assumption Testing and Results

Mahalanobis Distance MANCOVA Model 1

```
*--------------------------------------.
*Main Model 1 MANOVA with negative emotions and believability HW
*--------------------------------------

REGRESSION
  /MISSING PAIRWISE
  /STATISTICS COEFF OUTS R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT ID
  /METHOD=ENTER scale_total_emotions scale_HW_believability
  /SAVE MAHAL.
```

Regression

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Scale HW believability, Scale of total emotions[b]	.	Enter

a. Dependent Variable: Identifaction Number
b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,018[a]	,000	-,003	280,41772

a. Predictors: (Constant), Scale HW believability, Scale of total emotions
b. Dependent Variable: Identifaction Number

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	17427,198	2	8713,599	,111	,895[b]
	Residual	54021627,006	687	78634,100		
	Total	54039054,204	689			

a. Dependent Variable: Identifaction Number
b. Predictors: (Constant), Scale HW believability, Scale of total emotions

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	477,966	37,404		12,778	,000
	Scale of total emotions	-5,938	12,972	-,018	-,458	,647
	Scale HW believability	1,099	6,711	,006	,164	,870

a. Dependent Variable: Identifaction Number

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	452,6696	479,7186	472,2607	5,02926	690
Std. Predicted Value	-3,895	1,483	,000	1,000	690
Standard Error of Predicted Value	10,801	44,264	17,708	5,326	690
Adjusted Predicted Value	447,2764	482,9691	472,2876	5,29356	690
Residual	-475,73917	673,49506	-1,96363	280,29325	690
Std. Residual	-1,697	2,402	-,007	1,000	690
Stud. Residual	-1,701	2,409	-,007	1,002	690
Deleted Residual	-478,50858	677,96057	-1,99049	281,54050	690
Stud. Deleted Residual	-1,704	2,418	-,007	1,003	690
Mahal. Distance	,024	16,169	1,997	2,046	690
Cook's Distance	,000	,021	,001	,002	690
Centered Leverage Value	,000	,023	,003	,003	690

a. Dependent Variable: Identifaction Number

Descriptives

			Statistic	Std. Error
Mahalanobis Distance	Mean		1,9971014	,07790395
	95% Confidence Interval for Mean	Lower Bound	1,8441438	
		Upper Bound	2,1500591	
	5% Trimmed Mean		1,7623677	
	Median		1,3026002	
	Variance		4,188	
	Std. Deviation		2,04636945	
	Minimum		,02364	

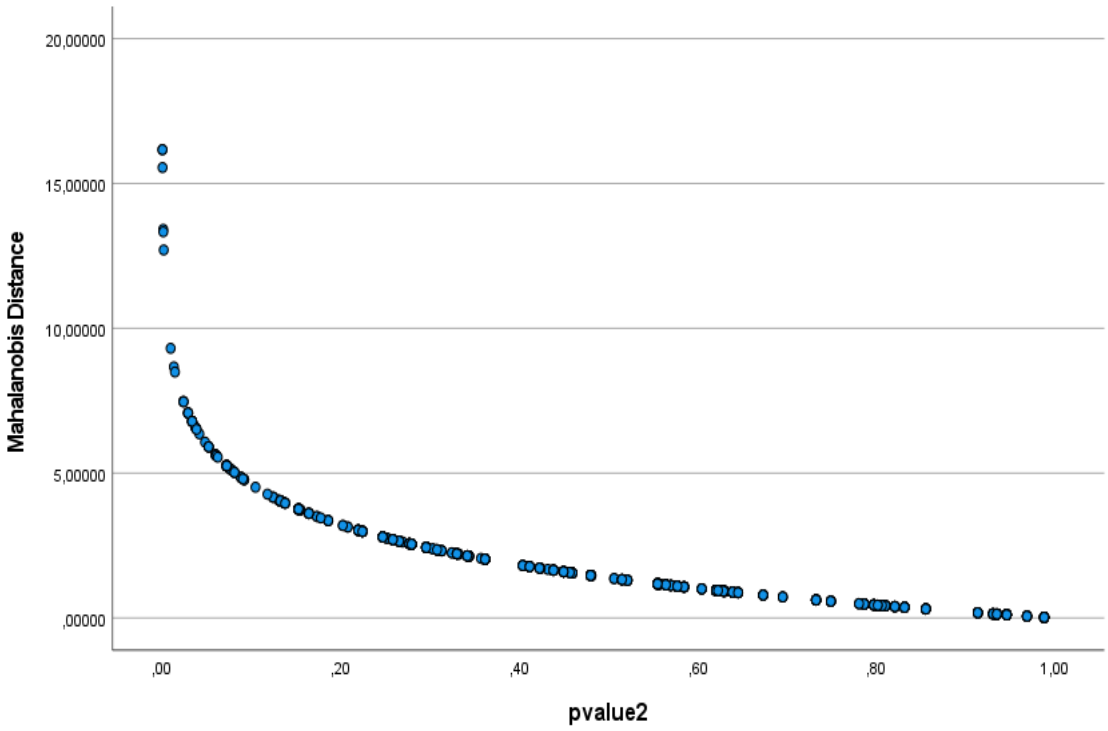
	Maximum	16,16925	
	Range	16,14561	
	Interquartile Range	1,86102	
	Skewness	2,774	,093
	Kurtosis	12,488	,186

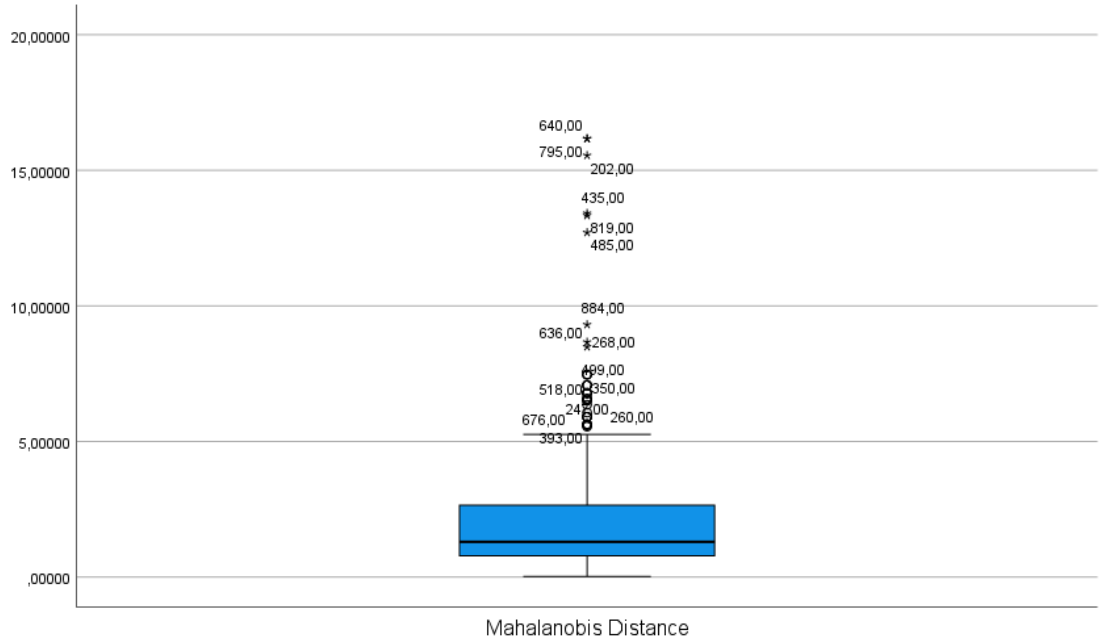
```
COMPUTE pvalue2=1-CDF.CHISQ(MAH_2,2).
EXECUTE.
FREQUENCIES VARIABLES=pvalue2
  /ORDER=ANALYSIS.
```

Statistics

pvalue2

N	Valid	690
	Missing	242






```
EXAMINE VARIABLES=MAH_2
  /ID=ID
  /PLOT BOXPLOT NPPLOT
  /COMPARE VARIABLES
  /STATISTICS DESCRIPTIVES EXTREME
  /CINTERVAL 95
  /MISSING LISTWISE
  /NOTOTAL.
```

Multivariate Normality, Dependent Variables MANCOVA Model 1 – without Multivariate Outliers

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Mahalanobis Distance	662	100,0%	0	0,0%	662	100,0%

Descriptives

			Statistic	Std. Error
Mahalanobis Distance	Mean		1,7134963	,05420248
	95% Confidence Interval for Mean	Lower Bound	1,6070665	
		Upper Bound	1,8199261	
	5% Trimmed Mean		1,6032870	
	Median		1,1774220	

	Variance	1,945	
	Std. Deviation	1,39459504	
	Minimum	,02364	
	Maximum	5,90985	
	Range	5,88621	
	Interquartile Range	1,77418	
	Skewness	1,079	,095
	Kurtosis	,501	,190

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,039[a]	,001	-,002	279,51217

a. Predictors: (Constant), Scale HW believability, Scale of total emotions

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	76461,014	2	38230,507	,489	,613[b]
	Residual	51485726,768	659	78127,051		
	Total	51562187,782	661			

a. Dependent Variable: Identifaction Number

b. Predictors: (Constant), Scale HW believability, Scale of total emotions

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	498,598	39,926		12,488	<,001		
	Scale of total emotions	-14,631	15,319	-,037	-,955	,340	,987	1,013
	Scale HW believability	-1,031	6,959	-,006	-,148	,882	,987	1,013

a. Dependent Variable: Identifaction Number

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions		
				(Constant)	Scale of total emotions	Scale HW believability
1	1	2,835	1,000	,01	,02	,01
	2	,117	4,920	,01	,75	,35
	3	,048	7,663	,98	,23	,64

a. Dependent Variable: Identifaction Number

Straightliner

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	,00	657	99,2	99,2	99,2
	1,00	5	,8	,8	100,0
	Total	662	100,0	100,0	

Statistics

Straightliner

N	Valid	657
	Missing	0

Straightliner

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	,00	657	100,0	100,0	100,0

Reliability Statistics

Cronbach's Alpha	N of Items
,752	2

Item Statistics

	Mean	Std. Deviation	N
How believable did you find the health warning(s)?	5,03	1,681	656
How convincing did you find the health warning?	3,95	1,817	656

Reliability Statistics

Cronbach's Alpha	N of Items
,658	3

Item Statistics

	Mean	Std. Deviation	N
Thinking about the advertisement you just viewed, how did you feel while viewing it? - Angry	1,49	,854	657
Thinking about the advertisement you just viewed, how did you feel while viewing it? - Scared	1,72	,927	657
Thinking about the advertisement you just viewed, how did you feel while viewing it? - Worried	1,90	1,000	657

Descriptive Statistics

	Factor_HW	Factor_AD	Mean	Std. Deviation	N
scale_HW_believability_Model 2	single-text	content limited ad	4,3783	1,47433	115
		non-limited ad with people	4,1481	1,58300	108
		Total	4,2668	1,52881	223
	graphic-text	content limited ad	4,5343	1,56582	102
		non-limited ad with people	4,3158	1,62293	114
		Total	4,4190	1,59626	216
	multiple-text	content limited ad	4,8009	1,56918	108
		non-limited ad with people	4,7591	1,54405	110
		Total	4,7798	1,55310	218
	Total	content limited ad	4,5677	1,54061	325
		non-limited ad with people	4,4081	1,60008	332
		Total	4,4871	1,57178	657
scale_total_emotions_Model2	single-text	content limited ad	1,8174	,70675	115
		non-limited ad with people	1,8272	,72699	108
		Total	1,8221	,71502	223
	graphic-text	content limited ad	1,8399	,78030	102
		non-limited ad with people	1,7427	,71373	114
		Total	1,7886	,74574	216
	multiple-text	content limited ad	1,5463	,63550	108
		non-limited ad with people	1,4545	,64605	110
		Total	1,5000	,64102	218
	Total	content limited ad	1,7344	,71879	325
		non-limited ad with people	1,6747	,71238	332
		Total	1,7042	,71564	657

Box's M Test MANCOVA Model 1

Box's Test of Equality of Covariance Matrices[a]

Box's M	8,447
F	,559
df1	15
df2	2109307,682
Sig.	,899

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.

a. Design: Intercept + alc_use_high_low + Q23 + Q22 + Factor_HW + Factor_AD + Factor_HW * Factor_AD

Results MANCOVA Model 1

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	,322	147,140[b]	2,000	621,000	<,001	,322
	Wilks' Lambda	,678	147,140[b]	2,000	621,000	<,001	,322
	Hotelling's Trace	,474	147,140[b]	2,000	621,000	<,001	,322
	Roy's Largest Root	,474	147,140[b]	2,000	621,000	<,001	,322
drinking_status	Pillai's Trace	,004	1,315[b]	2,000	621,000	,269	,004
	Wilks' Lambda	,996	1,315[b]	2,000	621,000	,269	,004
	Hotelling's Trace	,004	1,315[b]	2,000	621,000	,269	,004
	Roy's Largest Root	,004	1,315[b]	2,000	621,000	,269	,004
Q23	Pillai's Trace	,016	5,208[b]	2,000	621,000	,006	,016
	Wilks' Lambda	,984	5,208[b]	2,000	621,000	,006	,016
	Hotelling's Trace	,017	5,208[b]	2,000	621,000	,006	,016
	Roy's Largest Root	,017	5,208[b]	2,000	621,000	,006	,016
Q22	Pillai's Trace	,009	2,823[b]	2,000	621,000	,060	,009
	Wilks' Lambda	,991	2,823[b]	2,000	621,000	,060	,009
	Hotelling's Trace	,009	2,823[b]	2,000	621,000	,060	,009
	Roy's Largest Root	,009	2,823[b]	2,000	621,000	,060	,009
Factor_HW	Pillai's Trace	,073	11,832	4,000	1244,000	<,001	,037
	Wilks' Lambda	,927	12,037[b]	4,000	1242,000	<,001	,037
	Hotelling's Trace	,079	12,242	4,000	1240,000	<,001	,038
	Roy's Largest Root	,078	24,333[c]	2,000	622,000	<,001	,073
Factor_AD	Pillai's Trace	,004	1,174[b]	2,000	621,000	,310	,004
	Wilks' Lambda	,996	1,174[b]	2,000	621,000	,310	,004
	Hotelling's Trace	,004	1,174[b]	2,000	621,000	,310	,004
	Roy's Largest Root	,004	1,174[b]	2,000	621,000	,310	,004
Factor_HW * Factor_AD	Pillai's Trace	,003	,525	4,000	1244,000	,717	,002
	Wilks' Lambda	,997	,525[b]	4,000	1242,000	,717	,002
	Hotelling's Trace	,003	,524	4,000	1240,000	,718	,002
	Roy's Largest Root	,003	,962[c]	2,000	622,000	,383	,003

a. Design: Intercept + drinking_status + Q23 + Q22 + Factor_HW + Factor_AD + Factor_HW * Factor_AD

b. Exact statistic

c. The statistic is an upper bound on F that yields a lower bound on the significance level.

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	scale_total_emotions_Model2	23,002[a]	8	2,875	5,954	<,001	,071
	scale_HW_believability_Model2	43,198[b]	8	5,400	2,252	,022	,028
Intercept	scale_total_emotions_Model2	73,653	1	73,653	152,524	<,001	,197
	scale_HW_believability_Model2	438,528	1	438,528	182,873	<,001	,227
drinking_status	scale_total_emotions_Model2	,338	1	,338	,700	,403	,001
	scale_HW_believability_Model2	3,813	1	3,813	1,590	,208	,003
Q23	scale_total_emotions_Model2	4,968	1	4,968	10,287	,001	,016
	scale_HW_believability_Model2	1,619	1	1,619	,675	,412	,001
Q22	scale_total_emotions_Model2	2,655	1	2,655	5,498	,019	,009
	scale_HW_believability_Model2	,011	1	,011	,005	,945	,000
Factor_HW	scale_total_emotions_Model2	13,882	2	6,941	14,374	<,001	,044
	scale_HW_believability_Model2	33,622	2	16,811	7,010	<,001	,022
Factor_AD	scale_total_emotions_Model2	,741	1	,741	1,534	,216	,002
	scale_HW_believability_Model2	2,729	1	2,729	1,138	,286	,002
Factor_HW * Factor_AD	scale_total_emotions_Model2	,291	2	,146	,302	,740	,001
	scale_HW_believability_Model2	3,065	2	1,532	,639	,528	,002
Error	scale_total_emotions_Model2	300,362	622	,483			
	scale_HW_believability_Model2	1491,551	622	2,398			
Total	scale_total_emotions_Model2	2173,000	631				
	scale_HW_believability_Model2	14317,000	631				
Corrected Total	scale_total_emotions_Model2	323,364	630				
	scale_HW_believability_Model2	1534,750	630				

a. R Squared = ,071 (Adjusted R Squared = ,059)

b. R Squared = ,028 (Adjusted R Squared = ,016)

1. Grand Mean

Dependent Variable	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
scale_total_emotions_Model2	1,712[a]	,028	1,658	1,766
scale_HW_believability_Model2	4,505[a]	,062	4,384	4,626

a. Covariates appearing in the model are evaluated at the following values: Drinking status = , 9081, age = 30,5705, Gender = 1,58.

2. Factor_HW

Dependent Variable	Factor_HW	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
scale_total_emotions_Model2	single-text	1,827[a]	,047	1,734	1,920
	graphic-text	1,808[a]	,048	1,713	1,903
	multiple-text	1,501[a]	,048	1,407	1,596
scale_HW_believability_Model 2	single-text	4,268[a]	,106	4,060	4,475
	graphic-text	4,428[a]	,108	4,216	4,640
	multiple-text	4,819[a]	,107	4,608	5,030

a. Covariates appearing in the model are evaluated at the following values: Drinking status = ,9081, age = 30,5705, Gender = 1,58.

3. Factor_AD

Dependent Variable	Factor_AD	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
scale_total_emotions_Model2	content limited ad	1,746[a]	,039	1,669	1,824
	non-limited ad with people	1,678[a]	,039	1,601	1,754
scale_HW_believability_Model 2	content limited ad	4,571[a]	,088	4,398	4,743
	non-limited ad with people	4,439[a]	,087	4,269	4,609

a. Covariates appearing in the model are evaluated at the following values: Drinking status = ,9081, age = 30,5705, Gender = 1,58.

*4. Factor_HW * Factor_AD*

Dependent Variable	Factor_HW	Factor_AD	Mean	Std. Error	95% Confidence Interval	
					Lower Bound	Upper Bound
scale_total_emotions_Model2	single-text	content limited ad	1,831[a]	,067	1,700	1,963
		non-limited ad with people	1,822[a]	,067	1,690	1,954
	graphic-text	content limited ad	1,852[a]	,071	1,714	1,991
		non-limited ad with people	1,764[a]	,066	1,633	1,894
	multiple-text	content limited ad	1,555[a]	,068	1,423	1,688
		non-limited ad with people	1,447[a]	,069	1,312	1,582
scale_HW_believability_Model 2	single-text	content limited ad	4,394[a]	,149	4,100	4,687
		non-limited ad with people	4,142[a]	,150	3,847	4,436
	graphic-text	content limited ad	4,532[a]	,157	4,223	4,841
		non-limited ad with people	4,324[a]	,148	4,034	4,615
	multiple-text	content limited ad	4,787[a]	,151	4,491	5,082
		non-limited ad with people	4,851[a]	,153	4,550	5,153

a. Covariates appearing in the model are evaluated at the following values: Drinking status = ,9081, age = 30,5705, Gender = 1,58.

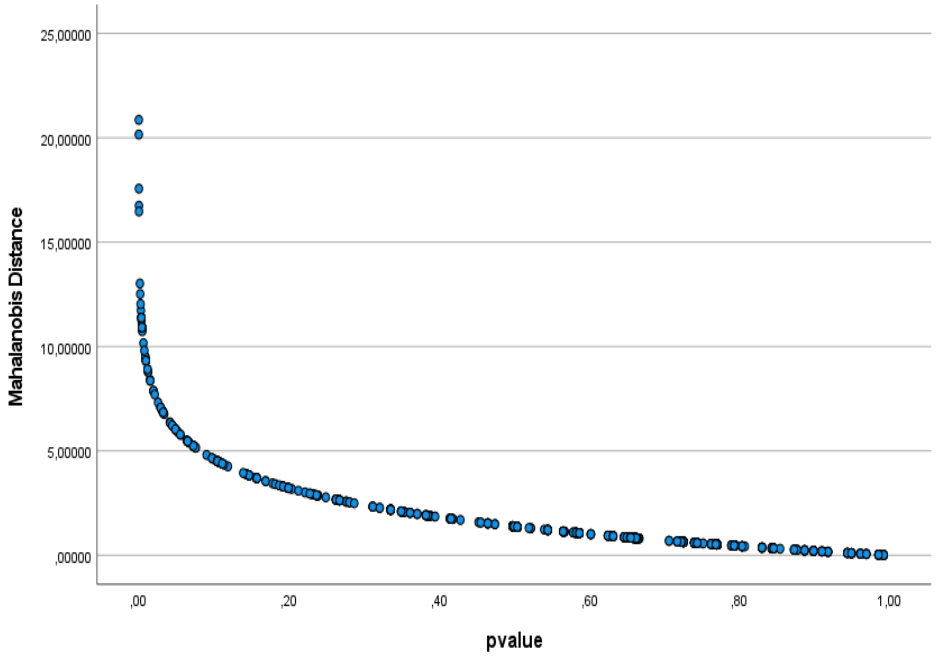
Post Hoc Test MANOVA Model 1

Multiple Comparisons

Dependent Variable		(I) Factor HW	(J) Factor HW	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
Scale HW believability	Bonferroni	single-text	image-text	-,1667	,14857	,787	-,5233	,1899
			multiple-text	-,5205*	,14806	,001	-,8759	-,1651
		image-text	single-text	,1667	,14857	,787	-,1899	,5233
			multiple-text	-,3538	,14890	,053	-,7112	,0035
		multiple-text	single-text	,5205*	,14806	,001	,1651	,8759
			image-text	,3538	,14890	,053	-,0035	,7112
	Hochberg	single-text	image-text	-,1667	,14857	,598	-,5223	,1890
			multiple-text	-,5205*	,14806	,001	-,8749	-,1661
		image-text	single-text	,1667	,14857	,598	-,1890	,5223
			multiple-text	-,3538	,14890	,052	-,7103	,0026
		multiple-text	single-text	,5205*	,14806	,001	,1661	,8749
			image-text	,3538	,14890	,052	-,0026	,7103
Scale of total emotions	Bonferroni	single-text	image-text	,0347	,06682	1,000	-,1257	,1950
			multiple-text	,3168*	,06659	,000	,1570	,4767
		image-text	single-text	-,0347	,06682	1,000	-,1950	,1257
			multiple-text	,2822*	,06697	,000	,1215	,4429
		multiple-text	single-text	-,3168*	,06659	,000	-,4767	-,1570
			image-text	-,2822*	,06697	,000	-,4429	-,1215
	Hochberg	single-text	image-text	,0347	,06682	,938	-,1253	,1946
			multiple-text	,3168*	,06659	,000	,1575	,4762
		image-text	single-text	-,0347	,06682	,938	-,1946	,1253
			multiple-text	,2822*	,06697	,000	,1219	,4425
		multiple-text	single-text	-,3168*	,06659	,000	-,4762	-,1575
			image-text	-,2822*	,06697	,000	-,4425	-,1219

Appendix J: MANCOVA Model 2 Assumption Testing and Results

Mahalanobis Distance MANCOVA Model 2



Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,141[a]	,020	,017	275,26658

a. Predictors: (Constant), Scale total self efficacy, Scale total riskperceptions

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1175421,038	2	587710,519	7,756	<,001[b]
	Residual	58344203,022	770	75771,692		
	Total	59519624,060	772			

a. Dependent Variable: Identifaction Number

b. Predictors: (Constant), Scale total self efficacy, Scale total riskperceptions

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	441,218	77,721		5,677	<,001		
	Scale total riskperceptions	27,624	7,905	,131	3,495	<,001	,913	1,096
	Scale total self efficacy	-7,655	10,877	-,026	-,704	,482	,913	1,096

a. Dependent Variable: Identifaction Number

Straightliner

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	,00	773	100,0	100,0	100,0

Item Statistics

	Mean	Std. Deviation	N
risk perceptions - Alcohol consumption has damaged my health	2,58	1,668	773
risk perceptions - I am worried that drinking will damage my health in the future	2,87	1,806	773
risk perceptions - Drinking alcohol has lowered my quality of life	1,99	1,312	773
risk perceptions - I am worried that drinking alcohol may lower my quality of life in the future	2,48	1,685	773

Reliability Statistics

Cronbach's Alpha	N of Items
,820	4

Item Statistics

	Mean	Std. Deviation	N
Overall, how confident are you that you can reduce your drinking right now?	6,37	1,059	773
Cutting down on the number of alcohol units that you drink in the next week would be:	6,32	1,138	773

Reliability Statistics

Cronbach's Alpha	N of Items
,671	2

Statistics

Mahalanobis Distance		
N	Valid	773
	Missing	0
Mean		1,3635644
Median		1,0801386
Mode		1,36960
Skewness		1,741
Std. Error of Skewness		0,088
Kurtosis		2,917
Std. Error of Kurtosis		0,176

Box's Test of Equality of Covariance Matrices

Box's M	19,682
F	0,929
df1	21
df2	1862619,415
Sig.	0,553

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.
a. Design: Intercept + Q23 + Q22 + Factor_HW + Factor_AD + Factor_HW * Factor_AD

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	,800	1464,204[b]	2,000	734,000	<,001	,800
	Wilks' Lambda	,200	1464,204[b]	2,000	734,000	<,001	,800
	Hotelling's Trace	3,990	1464,204[b]	2,000	734,000	<,001	,800
	Roy's Largest Root	3,990	1464,204[b]	2,000	734,000	<,001	,800
Q23	Pillai's Trace	,068	26,570[b]	2,000	734,000	<,001	,068
	Wilks' Lambda	,932	26,570[b]	2,000	734,000	<,001	,068
	Hotelling's Trace	,072	26,570[b]	2,000	734,000	<,001	,068
	Roy's Largest Root	,072	26,570[b]	2,000	734,000	<,001	,068
Q22	Pillai's Trace	,025	9,222[b]	2,000	734,000	<,001	,025
	Wilks' Lambda	,975	9,222[b]	2,000	734,000	<,001	,025
	Hotelling's Trace	,025	9,222[b]	2,000	734,000	<,001	,025
	Roy's Largest Root	,025	9,222[b]	2,000	734,000	<,001	,025
Factor_HW	Pillai's Trace	,001	,237	4,000	1470,000	,918	,001
	Wilks' Lambda	,999	,236[b]	4,000	1468,000	,918	,001
	Hotelling's Trace	,001	,236	4,000	1466,000	,918	,001
	Roy's Largest Root	,001	,466[c]	2,000	735,000	,628	,001
Factor_AD	Pillai's Trace	,005	,923	4,000	1470,000	,450	,003
	Wilks' Lambda	,995	,922[b]	4,000	1468,000	,450	,003
	Hotelling's Trace	,005	,921	4,000	1466,000	,451	,003
	Roy's Largest Root	,004	1,516[c]	2,000	735,000	,220	,004
Factor_HW * Factor_AD	Pillai's Trace	,006	1,140	4,000	1470,000	,336	,003
	Wilks' Lambda	,994	1,139[b]	4,000	1468,000	,336	,003
	Hotelling's Trace	,006	1,138	4,000	1466,000	,337	,003
	Roy's Largest Root	,005	1,820[c]	2,000	735,000	,163	,005

a. Design: Intercept + Q23 + Q22 + Factor_HW + Factor_AD + Factor_HW * Factor_AD

b. Exact statistic

c. The statistic is an upper bound on F that yields a lower bound on the significance level.

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	scale_total_riskperceptions_model1	39,846[a]	9	4,427	2,628	,005	,031
	scale_total_self_efficacy_model1	39,191[b]	9	4,355	5,039	<,001	,058
Intercept	scale_total_riskperceptions_model1	459,233	1	459,233	272,550	<,001	,271
	scale_total_self_efficacy_model1	1638,002	1	1638,002	1895,501	<,001	,721
Q23	scale_total_riskperceptions_model1	22,476	1	22,476	13,339	<,001	,018
	scale_total_self_efficacy_model1	19,965	1	19,965	23,103	<,001	,030
Q22	scale_total_riskperceptions_model1	15,578	1	15,578	9,246	,002	,012
	scale_total_self_efficacy_model1	12,828	1	12,828	14,844	<,001	,020
Factor_HW	scale_total_riskperceptions_model1	1,119	2	,560	,332	,717	,001
	scale_total_self_efficacy_model1	,059	2	,030	,034	,966	,000
Factor_AD	scale_total_riskperceptions_model1	3,482	2	1,741	1,033	,356	,003
	scale_total_self_efficacy_model1	,834	2	,417	,483	,617	,001
Factor_HW * Factor_AD	scale_total_riskperceptions_model1	1,561	2	,781	,463	,629	,001
	scale_total_self_efficacy_model1	2,952	2	1,476	1,708	,182	,005
Error	scale_total_riskperceptions_model1	1238,437	735	1,685			
	scale_total_self_efficacy_model1	635,152	735	,864			
Total	scale_total_riskperceptions_model1	5830,125	745				
	scale_total_self_efficacy_model1	30667,000	745				
Corrected Total	scale_total_riskperceptions_model1	1278,283	744				
	scale_total_self_efficacy_model1	674,344	744				

a. R Squared = ,031 (Adjusted R Squared = ,019)

b. R Squared = ,058 (Adjusted R Squared = ,047)

Appendix K: MANOVA Model 3 Assumption Testing and Results

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	knowledge of alcohol risks - Alcohol can cause liver disease(s), knowledge of alcohol risks - Alcohol can cause cancer of the mouth, pharynx, larynx, oesophagus, liver, pancreas, bowel and breast, knowledge of alcohol risks - Alcohol can cause mental health problems, knowledge of alcohol risks - Drinking alcohol when pregnant harms the unborn baby, knowledge of alcohol risks - Alcohol can be addictive, knowledge of alcohol risks - Drinking impairs ability to operate machinery[b]	.	Enter

a. Dependent Variable: Identifaction Number

b. All requested variables entered.

Coefficients[a]

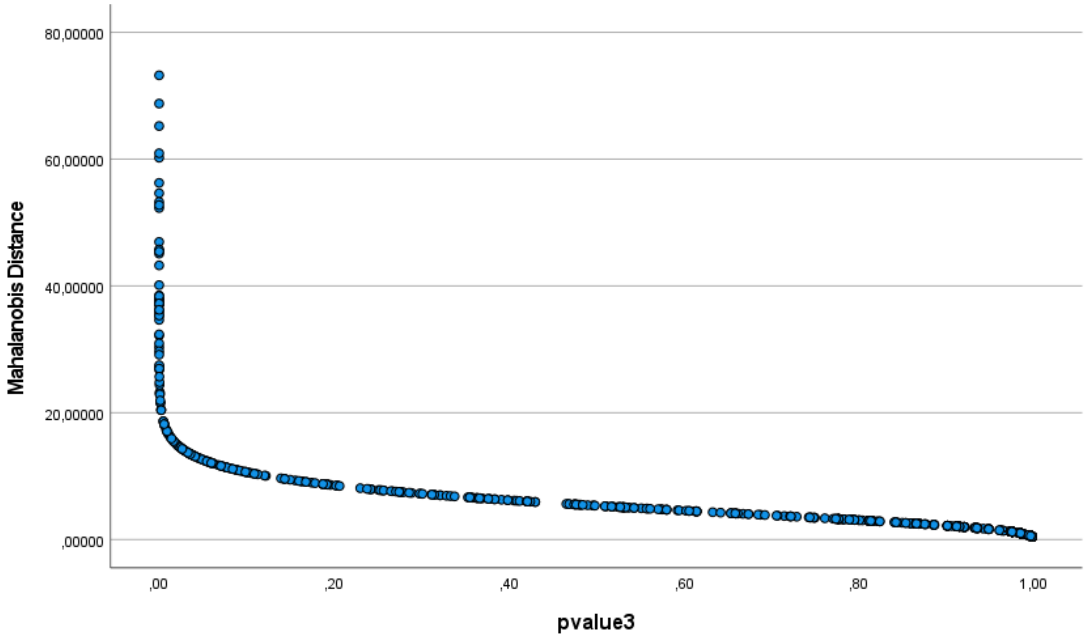
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	720,432	66,035		10,910	<,001
	knowledge of alcohol risks - Alcohol can cause mental health problems	4,635	8,298	,023	,559	,577
	knowledge of alcohol risks - Alcohol can be addictive	-45,817	12,017	-,183	-3,813	<,001
	knowledge of alcohol risks - Drinking alcohol when pregnant harms the unborn baby	24,243	10,754	,097	2,254	,024
	knowledge of alcohol risks - Alcohol can cause cancer of the mouth, pharynx, larynx, oesophagus, liver, pancreas, bowel and breast	-10,232	6,649	-,056	-1,539	,124
	knowledge of alcohol risks - Drinking impairs ability to operate machinery	-17,670	12,731	-,069	-1,388	,165
	knowledge of alcohol risks - Alcohol can cause liver disease (s)	4,756	14,835	,018	,321	,749

a. Dependent Variable: Identifaction Number

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	315,0595	728,8343	467,8877	52,24429	915
Std. Predicted Value	-2,925	4,995	,000	1,000	915
Standard Error of Predicted Value	10,913	78,096	21,017	11,530	915
Adjusted Predicted Value	319,3260	754,8174	467,8888	52,81476	915
Residual	-652,59106	686,92804	-1,01117	272,60604	915
Std. Residual	-2,381	2,507	-,004	,995	915
Stud. Residual	-2,430	2,511	-,004	,999	915
Deleted Residual	-679,60669	690,52185	-1,01235	274,98623	915
Stud. Deleted Residual	-2,437	2,519	-,004	1,000	915
Mahal. Distance	,451	73,232	5,993	9,527	915
Cook's Distance	,000	,036	,001	,003	915
Centered Leverage Value	,000	,080	,007	,010	915

a. Dependent Variable: Identifaction Number



Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,215[a]	,046	,039	269,47000

a. Predictors: (Constant), knowledge of alcohol risks - Alcohol can cause liver disease(s), knowledge of alcohol risks - Alcohol can cause cancer of the mouth, pharynx, larynx, oesophagus, liver, pancreas, bowel and breast, knowledge of alcohol risks - Drinking alcohol when pregnant harms the unborn baby, knowledge of alcohol risks - Alcohol can cause mental health problems, knowledge of alcohol risks - Drinking impairs ability to operate machinery, knowledge of alcohol risks - Alcohol can be addictive

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2793154,264	6	465525,711	6,411	<,001[b]
	Residual	57510352,081	792	72614,081		
	Total	60303506,345	798			

a. Dependent Variable: Identifaction Number

b. Predictors: (Constant), knowledge of alcohol risks - Alcohol can cause liver disease(s), knowledge of alcohol risks - Alcohol can cause cancer of the mouth, pharynx, larynx, oesophagus, liver, pancreas, bowel and breast, knowledge of alcohol risks - Drinking alcohol when pregnant harms the unborn baby, knowledge of alcohol risks - Alcohol can cause mental health problems, knowledge of alcohol risks - Drinking impairs ability to operate machinery, knowledge of alcohol risks - Alcohol can be addictive

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1154,226	158,842		7,267	<,001		
	knowledge of alcohol risks - Alcohol can cause mental health problems	3,791	11,076	,014	,342	,732	,726	1,378
	knowledge of alcohol risks - Alcohol can be addictive	-71,039	18,159	-,169	-3,912	<,001	,643	1,555
	knowledge of alcohol risks - Drinking alcohol when pregnant harms the unborn baby	28,533	15,800	,069	1,806	,071	,836	1,196
	knowledge of alcohol risks - Alcohol can cause cancer of the mouth, pharynx, larynx, oesophagus, liver, pancreas, bowel and breast	-2,816	7,850	-,013	-,359	,720	,873	1,145
	knowledge of alcohol risks - Drinking impairs ability to operate machinery	-30,443	24,196	-,053	-1,258	,209	,689	1,452
	knowledge of alcohol risks - Alcohol can cause liver disease (s)	-31,011	22,323	-,061	-1,389	,165	,629	1,590

a. Dependent Variable: Identifaction Number

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions						
				(Constant)	knowledge of alcohol risks - Alcohol can cause mental health problems	knowledge of alcohol risks - Alcohol can be addictive	knowledge of alcohol risks - Drinking alcohol when pregnant harms the unborn baby	knowledge of alcohol risks - Alcohol can cause cancer of the mouth, pharynx, larynx, oesophagus, liver, pancreas, bowel and breast	knowledge of alcohol risks - Drinking impairs ability to operate machinery	knowledge of alcohol risks - Alcohol can cause liver disease(s)
1	1	6,927	1,000	,00	,00	,00	,00	,00	,00	,00
	2	,038	13,485	,00	,00	,00	,00	,97	,00	,00
	3	,018	19,457	,01	,81	,00	,03	,01	,01	,01
	4	,007	31,973	,00	,06	,17	,81	,00	,01	,05
	5	,005	37,763	,05	,12	,80	,12	,00	,09	,05
	6	,003	47,729	,44	,00	,01	,04	,02	,03	,75
	7	,002	54,844	,48	,00	,01	,00	,00	,87	,14

a. Dependent Variable: Identifaction Number

Statistics

Straightliner

N	Valid	799
	Missing	0

Straightliner

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	,00	799	100,0	100,0	100,0

Factor_HW

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	single-text	205	25,7	25,7	25,7
	graphic-text	195	24,4	24,4	50,1
	multiple-text	202	25,3	25,3	75,3
	absence of HW	197	24,7	24,7	100,0
	Total	799	100,0	100,0	

no_HW_vs_HW

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no_HW	197	24,7	24,7	24,7
	HW	602	75,3	75,3	100,0
	Total	799	100,0	100,0	

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	,995	27064,637[b]	6,000	790,000	,000
	Wilks' Lambda	,005	27064,637[b]	6,000	790,000	,000
	Hotelling's Trace	205,554	27064,637[b]	6,000	790,000	,000
	Roy's Largest Root	205,554	27064,637[b]	6,000	790,000	,000
Factor_AD1	Pillai's Trace	,005	,659[b]	6,000	790,000	,683
	Wilks' Lambda	,995	,659[b]	6,000	790,000	,683
	Hotelling's Trace	,005	,659[b]	6,000	790,000	,683
	Roy's Largest Root	,005	,659[b]	6,000	790,000	,683
no_HW_vs_HW	Pillai's Trace	,015	2,059[b]	6,000	790,000	,056
	Wilks' Lambda	,985	2,059[b]	6,000	790,000	,056
	Hotelling's Trace	,016	2,059[b]	6,000	790,000	,056
	Roy's Largest Root	,016	2,059[b]	6,000	790,000	,056
Factor_AD1 * no_HW_vs_HW	Pillai's Trace	,010	1,371[b]	6,000	790,000	,223
	Wilks' Lambda	,990	1,371[b]	6,000	790,000	,223
	Hotelling's Trace	,010	1,371[b]	6,000	790,000	,223
	Roy's Largest Root	,010	1,371[b]	6,000	790,000	,223

a. Design: Intercept + Factor_AD1 + no_HW_vs_HW + Factor_AD1 * no_HW_vs_HW

b. Exact statistic

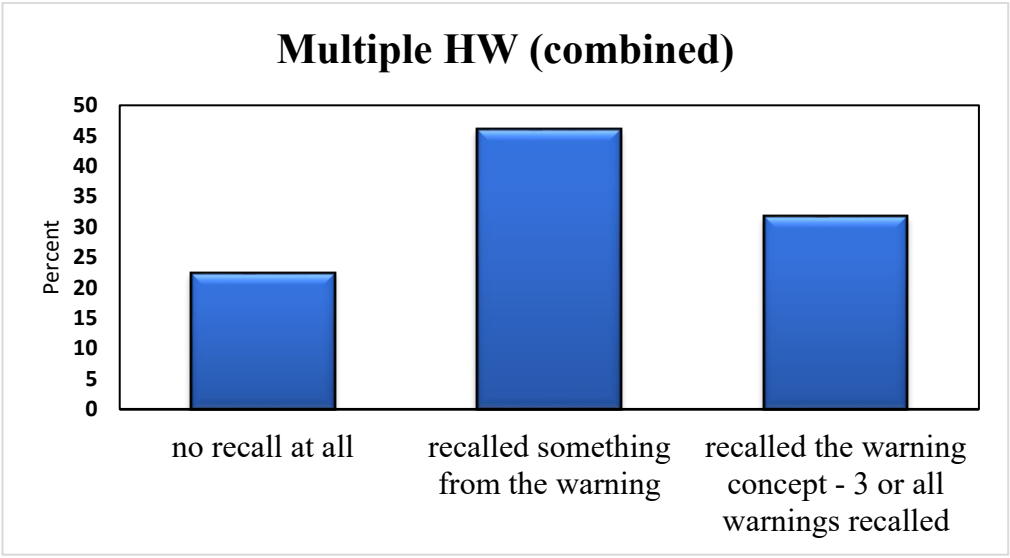
Appendix L: Frequency Tables for Recall and Multinomial Regression

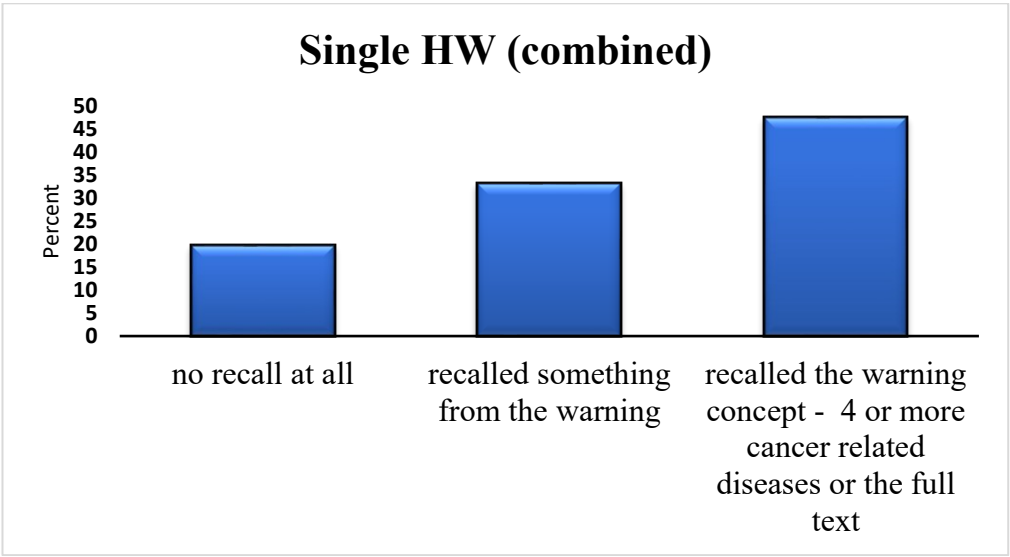
Single HW on Product-Only Alcohol Ads	*n*	%	*Valid %*	*Cumulative %*
no recall	43	4,6	18,9	18,9
one type of cancer or key words “causes variety of cancers”	47	5,0	20,6	39,5
2 out of 8 types of cancer recalled	18	1,9	7,9	47,4
3 out of 8 types of cancer recalled	34	3,6	14,9	62,3
4 out of 8 types of cancer recalled	32	3,4	14,0	76,3
5 out of 8 types of cancer recalled	34	3,6	14,9	91,2
6 out of 8 types of cancer recalled	13	1,4	5,7	96,9
7 out of 8 types of cancer recalled	3	0,3	1,3	98,2
full recall	4	0,4	1,8	100,0
Total	228	24,5	100,0	
System	704	75,5		
	932	100,0		

Single HW on Social Imagery Ads	*n*	*%*	*Valid %*	*Cumulative %*
no recall	46	4.9	20.0	20.0
one type of cancer or key words “causes variety of cancers”	62	6.7	27.0	47.0
2 out of 8 cancer types recalled	23	2.5	10.0	57.0
3 out of 8 cancer types recalled	29	3.1	12.6	69.6
4 out of 8 cancer typesrecalled	26	2.8	11.3	80.9
5 out of 8 cancer types recalled	29	3.1	12.6	93.5
6 out of 8 cancer types recalled	8	0.9	3.5	97.0
7 out of 8 cancer types recalled	3	0.3	1.3	98.3
all cancer types recalled	4	0.4	1.7	100.0
Total	230	24.7	100.0	
System	702	75.3		
	932	100.0		

Multiple HW on Product-Only Alcohol Ads	*n*	*%*	*Valid %*	*Cumulative %*
no recall	26	2.8	22.6	22.6
1 message recalled	27	2.9	23.5	46.1
2 messages recalled	26	2.8	22.6	68.7
3 messages recalled	27	2.9	23.5	92.2
4 messages recalled	9	1.0	7.8	100.0
Total	115	12.3	100.0	
System	817	87.7		
	932	100.0		

Multiple HW on Social Imagery Ads	*n*	*%*	*Valid %*	*Cumulative %*
no recall	24	2.6	22.0	22.0
1 message recalled	23	2.5	21.1	43.1
2 messages recalled	27	2.9	24.8	67.9
3 messages recalled	30	3.2	27.5	95.4
4 messages recalled	5	0.5	4.6	100.0
Total	109	11.7	100.0	
System	823	88.3		
	932	100.0		





Multinomial Regression:

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	dum_Ad, dum_HW_multiple, age, Drinking status, Gender_binom, dum_HW_graphic[b]	.	Enter

a. Dependent Variable: Identifaction Number

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,973[a]	,946	,946	64,85772

a. Predictors: (Constant), dum_Ad, dum_HW_multiple, age, Drinking status, Gender_binom, dum_HW_graphic

b. Dependent Variable: Identifaction Number

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	47630643,008	6	7938440,501	1887,174	,000[b]
	Residual	2713207,814	645	4206,524		
	Total	50343850,823	651			

a. Dependent Variable: Identifaction Number

b. Predictors: (Constant), dum_Ad, dum_HW_multiple, age, Drinking status, Gender_binom, dum_HW_graphic

Coefficients[a]

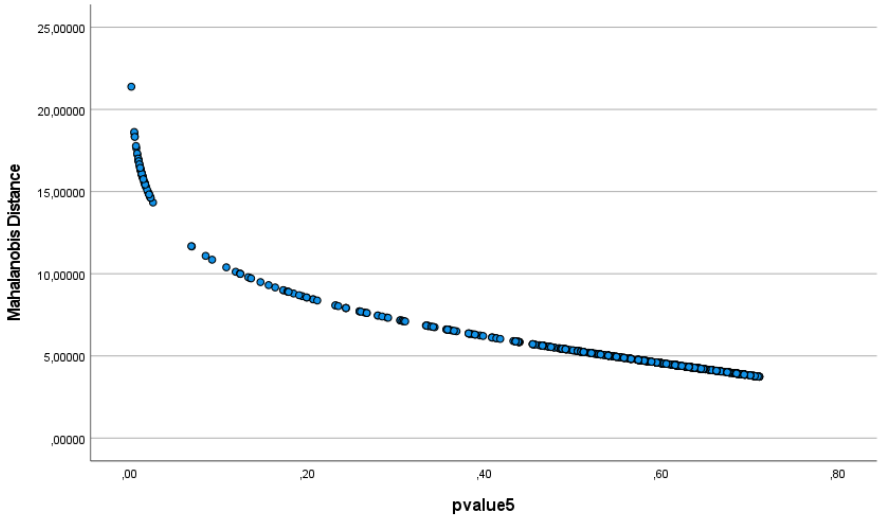
		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	1567,119	14,482		108,212	,000
	dum_HW_graphic	5,201	6,185	,009	,841	,401
	dum_HW_multiple	5,024	6,262	,008	,802	,423
	age	-10,183	,205	-,458	-49,741	<,001
	Gender_binom	-509,248	5,161	-,908	-98,680	,000
	Drinking status	8,353	9,311	,008	,897	,370
	dum_Ad	-3,879	5,086	-,007	-,763	,446

a. Dependent Variable: Identifaction Number

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	-78,2618	887,9500	465,7587	268,34567	650
Std. Predicted Value	-2,019	1,553	-,008	,992	650
Standard Error of Predicted Value	5,534	12,026	6,637	1,409	650
Adjusted Predicted Value	-79,8941	887,9057	465,9042	268,59431	650
Residual	-324,13153	132,55330	-19,39559	59,28190	650
Std. Residual	-4,998	2,044	-,299	,914	650
Stud. Residual	-5,020	2,071	-,300	,919	650
Deleted Residual	-326,99933	136,17070	-19,54110	59,93397	650
Stud. Deleted Residual	-5,117	2,077	-,300	,920	650
Mahal. Distance	3,741	21,385	6,125	3,537	650
Cook's Distance	,000	,032	,001	,002	650
Centered Leverage Value	,006	,033	,009	,005	650

a. Dependent Variable: Identifaction Number



Mala_Model_5

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	,00	62	6,8	9,5	9,5
	1,00	588	64,1	90,5	100,0
	Total	650	70,9	100,0	
Missing	System	267	29,1		
Total		917	100,0		

Statistics

		dum_HW_graphic	dum_HW_multiple	age	Gender_binom	Drinking status	dum_Ad
N	Valid	684	684	878	875	917	684
	Missing	233	233	39	42	0	233

ci

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	dum_Ad, age, dum_HW_multiple, Drinking status, Gender_binom, dum_HW_graphic[b]	.	Enter

a. Dependent Variable: Identifaction Number

b. All requested variables entered.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	39749237,737	6	6624872,956	2139,829	,000[b]
	Residual	1953565,249	631	3095,983		
	Total	41702802,986	637			

a. Dependent Variable: Identifaction Number

b. Predictors: (Constant), dum_Ad, age, dum_HW_multiple, Drinking status, Gender_binom, dum_HW_graphic

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	1489,879	12,183		122,294	,000		
	dum_HW_graphic	-3,415	5,362	-,006	-,637	,524	,754	1,327
	dum_HW_multiple	-6,842	5,444	-,013	-1,257	,209	,749	1,335
	age	-9,605	,179	-,467	-53,714	<,001	,983	1,018
	Gender_binom	-470,318	4,488	-,911	-104,796	,000	,983	1,017
	Drinking status	-9,198	7,588	-,011	-1,212	,226	,989	1,011
	dum_Ad	-,981	4,413	-,002	-,222	,824	,997	1,003

a. Dependent Variable: Identifaction Number

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions						
				(Constant)	dum_HW_graphic	dum_HW_multiple	age	Gender_binom	Drinking status	dum_Ad
1	1	4,999	1,000	,00	,01	,01	,00	,00	,00	,01
	2	1,001	2,234	,00	,24	,26	,00	,00	,00	,00
	3	,463	3,286	,00	,07	,04	,01	,00	,00	,90
	4	,290	4,151	,00	,66	,64	,03	,01	,03	,05
	5	,136	6,068	,00	,00	,00	,71	,16	,04	,00
	6	,086	7,616	,00	,00	,02	,04	,41	,62	,00
	7	,025	14,134	,99	,03	,03	,21	,41	,31	,03

a. Dependent Variable: Identifaction Number

Case Processing Summary

		N	Marginal Percentage
Warning_recall	no recall at all	125	19,6%
	recalled something from the warning	238	37,3%
	recalled the warning concept	275	43,1%
Valid		638	100,0%
Missing		0	
Total		638	
Subpopulation		344[a]	

a. The dependent variable has only one value observed in 240 (69,8%) subpopulations.

Model Fitting Information

	Model Fitting Criteria			Likelihood Ratio Tests		
Model	AIC	BIC	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	980,135	989,051	976,135			
Final	946,068	1008,485	918,068	58,067	12	<,001

Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	645,132	674	,782
Deviance	695,487	674	,275

Pseudo R-Square

Cox and Snell	,087
Nagelkerke	,099
McFadden	,043

Likelihood Ratio Tests

	Model Fitting Criteria			Likelihood Ratio Tests		
Effect	AIC of Reduced Model	BIC of Reduced Model	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	950,664	1004,164	926,664	8,596	2	,014
dum_HW_graphic	942,285	995,785	918,285	,217	2	,897
dum_HW_multiple	953,681	1007,181	929,681	11,613	2	,003
age	943,020	996,520	919,020	,952	2	,621
Gender_binom	972,613	1026,113	948,613	30,545	2	<,001
Drinking status	948,263	1001,763	924,263	6,195	2	,045
dum_Ad	945,795	999,295	921,795	3,727	2	,155

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.

Classification

Observed	Predicted			
	no recall at all	recalled something from the warning	recalled the warning concept	Percent Correct
no recall at all	0	63	62	0,0%
recalled something from the warning	0	132	106	55,5%
recalled the warning concept	0	80	195	70,9%
Overall Percentage	0,0%	43,1%	56,9%	51,3%

Drinking status

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	never drinkers	60	9,4	9,4	9,4
	drinkers	578	90,6	90,6	100,0
	Total	638	100,0	100,0	

dum_Ad

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	ad without people	316	49,5	49,5	49,5
	ad with people	322	50,5	50,5	100,0
	Total	638	100,0	100,0	

Multinomial Regression with Interaction Terms

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,977[a]	,954	,953	55,56037

a. Predictors: (Constant), Int_multiple_drinking, age, dum_Ad, Gender_binom, Drinking status, dum_HW_graphic, Int_multiple_ad, Int_graphic_ad, Int_multiple_age, Int_multiple_gender, Int_graphic_age, Int_graphic_gender, Int_graphic_drinking, dum_HW_multiple

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	39779630,152	14	2841402,154	920,455	,000[b]
	Residual	1923172,834	623	3086,955		
	Total	41702802,986	637			

a. Dependent Variable: Identifaction Number

b. Predictors: (Constant), Int_multiple_drinking, age, dum_Ad, Gender_binom, Drinking status, dum_HW_graphic, Int_multiple_ad, Int_graphic_ad, Int_multiple_age, Int_multiple_gender, Int_graphic_age, Int_graphic_gender, Int_graphic_drinking, dum_HW_multiple

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1485,460	21,847		67,994	<,001		
	dum_HW_graphic	3,854	29,780	,007	,129	,897	,024	41,046
	dum_HW_multiple	5,824	29,502	,011	,197	,844	,025	39,327
	age	-9,400	,309	-,457	-30,385	<,001	,327	3,055
	Gender_binom	-461,544	7,767	-,894	-59,425	<,001	,327	3,055
	Drinking status	-29,065	14,446	-,033	-2,012	,045	,272	3,675
	dum_Ad	5,127	7,568	,010	,677	,498	,338	2,959
	Int_graphic_ad	-3,552	10,718	-,005	-,331	,740	,289	3,460
	Int_multiple_ad	-16,432	10,885	-,023	-1,510	,132	,312	3,210
	Int_graphic_age	-,228	,436	-,015	-,524	,601	,094	10,668
	Int_multiple_age	-,473	,445	-,029	-1,063	,288	,096	10,373
	Int_graphic_gender	-19,672	10,914	-,061	-1,803	,072	,065	15,397
	Int_multiple_gender	-5,609	11,118	-,018	-,505	,614	,061	16,311
	Int_graphic_drinking	34,610	19,982	,063	1,732	,084	,057	17,663
	Int_multiple_drinking	19,733	18,657	,035	1,058	,291	,069	14,570

a. Dependent Variable: Identifaction Number

Case Processing Summary

		N	Marginal Percentage
Warning_recall	no recall at all	125	19,6%
	recalled something from the warning	238	37,3%
	recalled the warning concept	275	43,1%
Valid		638	100,0%
Missing		0	
Total		638	
Subpopulation		344[a]	

a. The dependent variable has only one value observed in 240 (69,8%) subpopulations.

Model Fitting Information

Model	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	976,135			
Final	906,248	69,886	28	<,001

Pseudo R-Square

Cox and Snell	,104
Nagelkerke	,118
McFadden	,052

Likelihood Ratio Tests

Effect	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	908,687	2,439	2	,295
dum_HW_graphic	906,473	,225	2	,894
dum_HW_multiple	906,345	,097	2	,953
age	906,276	,028	2	,986
Gender_binom	920,389	14,140	2	<,001
Drinking status	908,873	2,625	2	,269
dum_Ad	909,456	3,207	2	,201
Int_graphic_ad	906,413	,165	2	,921
Int_multiple_ad	907,890	1,642	2	,440
Int_graphic_age	906,505	,257	2	,879
Int_multiple_age	907,109	,861	2	,650
Int_graphic_gender	906,928	,680	2	,712
Int_multiple_gender	908,332	2,084	2	,353
Int_graphic_drinking	908,041	1,793	2	,408
Int_multiple_drinking	908,497	2,248	2	,325

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.

Parameter Estimates

Warning_recall[a]		B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
								Lower Bound	Upper Bound
recalled something from the warning	Intercept	1,705	1,384	1,518	1	,218			
	dum_HW_graphic	-,234	1,729	,018	1	,892	,791	,027	23,464
	dum_HW_multiple	-,321	1,746	,034	1	,854	,726	,024	22,238
	age	,003	,016	,025	1	,875	1,003	,972	1,034
	Gender_binom	,058	,408	,020	1	,886	1,060	,477	2,356
	Drinking status	-1,063	1,116	,907	1	,341	,346	,039	3,078
	dum_Ad	-,504	,397	1,609	1	,205	,604	,277	1,316
	Int_graphic_ad	,192	,561	,118	1	,731	1,212	,404	3,636
	Int_multiple_ad	,501	,551	,829	1	,362	1,651	,561	4,858
	Int_graphic_age	,000	,022	,000	1	,996	1,000	,957	1,045
	Int_multiple_age	-,008	,022	,124	1	,725	,992	,950	1,036
	Int_graphic_gender	-,444	,570	,606	1	,436	,642	,210	1,960
	Int_multiple_gender	,668	,557	1,440	1	,230	1,950	,655	5,807
	Int_graphic_drinking	,684	1,333	,263	1	,608	1,981	,145	27,038
	Int_multiple_drinking	-,631	1,362	,215	1	,643	,532	,037	7,670
recalled the warning concept	Intercept	,501	1,347	,138	1	,710			
	dum_HW_graphic	-,686	1,693	,164	1	,685	,504	,018	13,894
	dum_HW_multiple	-,541	1,787	,092	1	,762	,582	,018	19,334
	age	,002	,016	,021	1	,885	1,002	,972	1,033
	Gender_binom	1,119	,394	8,078	1	,004	3,060	1,415	6,619
	Drinking status	-1,462	1,076	1,844	1	,174	,232	,028	1,912
	dum_Ad	,031	,384	,006	1	,936	1,031	,485	2,190
	Int_graphic_ad	,208	,535	,151	1	,697	1,231	,432	3,512
	Int_multiple_ad	-,039	,559	,005	1	,945	,962	,322	2,877
	Int_graphic_age	-,008	,022	,146	1	,703	,992	,951	1,035
	Int_multiple_age	-,020	,023	,774	1	,379	,980	,937	1,025
	Int_graphic_gender	-,387	,544	,507	1	,476	,679	,234	1,972
	Int_multiple_gender	,090	,571	,025	1	,875	1,094	,357	3,351
	Int_graphic_drinking	1,456	1,294	1,267	1	,260	4,288	,340	54,113
	Int_multiple_drinking	,516	1,377	,141	1	,708	1,676	,113	24,886

a. The reference category is: no recall at all.

Appendix M: Employability Skills and Discipline-Specific Training

The following is a list of the employability skills and training undertaken throughout my years of study.

- **GRSO 1007 Entrepreneurship, Feb 2017** – studied as part of my MSc degree (recognition of prior learning [RPL])

- **GRSO 1001 Research Methods, Feb 2017** – studied as part of my MSc degree (recognition of prior learning [RPL])

- **GRSO 1005 Introduction to Statistics Jan 2017** – gaining skills in statistics was particularly important as my PhD dissertation is quantitative.

- **TFMK 9021 Marketing Communications, Jan 2017** – my entire educational background is in business and marketing, so this marketing-related module refreshed and improved my discipline-specific skills.

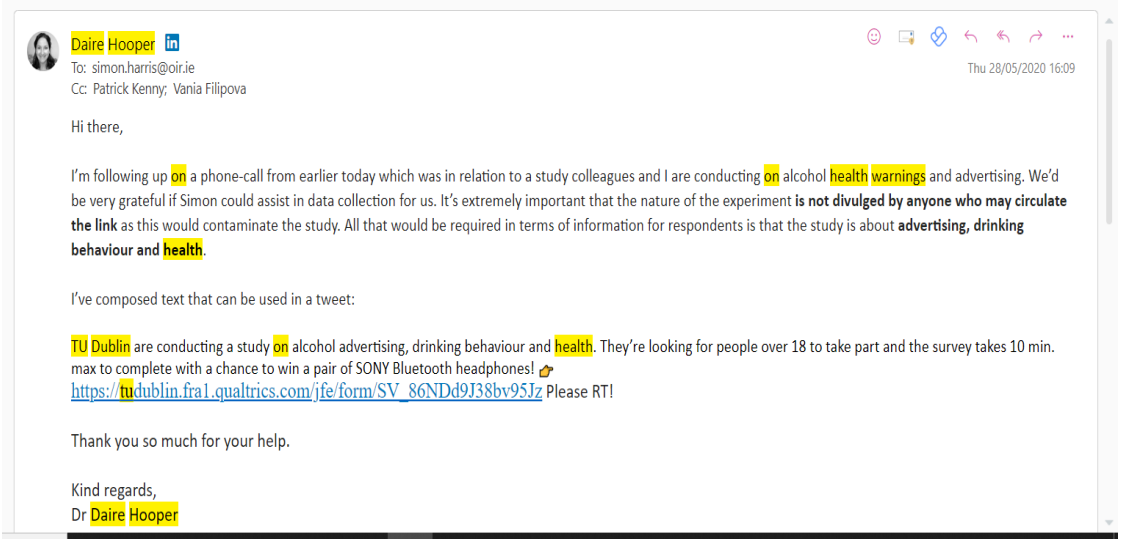
- **PRJM 2000 Project Management, Jan 2017** – this module is more technical and benefited me, particularly with presentation skills, communication, team work, time management, planning, and organising research tasks more formally.

- **GRSO 1010 Introduction to Pedagogy, Sep 2018** – this module provided a better idea of teaching and learning techniques in higher education. Teaching has been a part of my PhD journey.

- **Academic Writing, Jan 2018** – the rationale for taking a course in academic writing is straightforward. I am a non-native speaker, and writing in another language can be very challenging, let alone writing a PhD thesis in a foreign language. This course provided the basics in terms of academic writing and grammar.

- **Applied Multivariate Statistical Analysis, Aug 2019** –The rationale for taking this course relates to data analysis. It was necessary to gain advanced statistical knowledge in multivariate analysis of variance (MANOVA). My PhD is an experimental study, and learning multivariate analysis to analyse and interpret my study results were required.

Appendix N: Survey Invite Minister for Health



Daire Hooper
To: simon.harris@oir.ie
Cc: Patrick Kenny; Vania Filipova
Thu 28/05/2020 16:09

Hi there,

I'm following up on a phone-call from earlier today which was in relation to a study colleagues and I are conducting on alcohol health warnings and advertising. We'd be very grateful if Simon could assist in data collection for us. It's extremely important that the nature of the experiment **is not divulged by anyone who may circulate the link** as this would contaminate the study. All that would be required in terms of information for respondents is that the study is about **advertising, drinking behaviour and health**.

I've composed text that can be used in a tweet:

TU Dublin are conducting a study on alcohol advertising, drinking behaviour and health. They're looking for people over 18 to take part and the survey takes 10 min. max to complete with a chance to win a pair of SONY Bluetooth headphones!
https://tudublin.fra1.qualtrics.com/jfe/form/SV_86NDd9J38bv95Jz Please RT!

Thank you so much for your help.

Kind regards,
Dr Daire Hooper

Appendix O: Alcohol Ads Design and Social Imagery Examples


FOSTER'S ARAMIZDA. AVUSTRALYALI BİRA.
FOSTER'S
FOSTER'S

Posts

guinness • Following

Berlin, Germany


ROCKSHORE
ROCKSHORE
Get the facts. Be DRINKAWARE
Visit drinkaware.ie

guinness • Following
Open Gate Brewery

2,331 likes

guinness Toasting our delicious collaboration: a farmhouse ale created by our own Open Gate... more

View All 8 Comments

7 June 2017

guinness • Following
The Open Gate Brewery

guinness • Following

8,762 likes

2,569 likes

guinness Friends. Fire. Sunshine. BBQ Ribs. Guinness Original. What else do you need?

View All 12 Comments

Appendix P: Examples of Alcohol Ads with Pub Scenes

Product-Only Ad Example


Carlsberg
Probably the best beer in the world.


Carlsberg
HELP DENMARK'S BARS
COME BACK
STRONGER
LEARN MORE AT CARLSBERG.DK
#ADOPTAKEG

Appendix Q: Product Design and Labels (Irish Craft Beers)


oharasbeers
Carlow Brewing Company
51ST
-STATE-
IPA


irishcraftbeer
GALWAY BAY
FULL SAIL
IPA
Liked by your_brew_review and others
irishcraftbeer Galway bay for a Galway day #fullsail #ipa #irishcraftbeer #galwaybaybrewery #galwaybay
7 July 2017

oharasbeers


HOP HOUSE
hophousebangor
Bangor, County Down
Follow
FUL IRISH
SINGLE MALT
IPA
BOHEMIAN
PILSNER
LAGER
HOWLING GALE
PALE ALE
SUNBURNT
IRISH
RED ALE