

Report 1

Alcohol Warning Labels:

Evidence of effectiveness on risky alcohol consumption and short term outcomes

Prepared by National Drug Research Institute (Curtin University of Technology), in collaboration with Drug and Alcohol Office (WA), National Drug and Alcohol Research Centre (University of New South Wales), Public Health Advocacy Institute. (Curtin University of Technology)

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12 February 2009

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Preface

This report has been prepared for Food Standards Australia New Zealand (FSANZ) to assess the available evidence of the effectiveness of advisory statements on labels of packaged alcohol products. The report was prepared by National Drug Research Institute (Curtin University of Technology), in collaboration with the Drug and Alcohol Office (WA), National Drug and Alcohol Research Centre (University of New South Wales) and the Public Health Advocacy Unit (Curtin University of Technology).

This report includes:

- Review of the harms associated with the acute effects of alcohol use;
- Review of government strategies and responses in relation alcohol use;
- Discussion of a number of theoretical frameworks that underpin warning labels;
- Results of a scoping analysis to review and collate the advisory statements on labels of packaged alcohol that are available internationally;
- Critical review of the international research literature (published and grey literature) on the effectiveness of advisory statements on labels of packaged alcohol;
- Review of lessons learnt from the use of warning labels in the tobacco field;
- Discussion of the optimum measures of effectiveness if advisory statements on warning labels were to be introduced; and,
- A detailed summary of the report and reviewed evidence, and reflection on a series of issues for consideration.

Executive summary

Background

This report has been prepared for Food Standards Australia New Zealand (FSANZ), with the central aim of assessing the available evidence regarding effectiveness of advisory statements on labels of packaged alcohol products. The report was prepared by the National Drug Research Institute (Curtin University of Technology) in collaboration with the Drug and Alcohol Office (WA), National Drug and Alcohol Research Centre (University of New South Wales) and the Public Health Advocacy Unit (Curtin University of Technology).

This report has two primary objectives. These are:

1. To provide a comprehensive and objective review of the available evidence regarding the effectiveness of advisory statements on packaged alcohol products, drawing on domestic and international experience of alcoholic beverage labelling and comparable public health initiatives within the context of the Australian National Alcohol Strategy and New Zealand National Drug Policy.
2. To provide estimates of possible changes in outcomes which may be used to measure the effectiveness of labelling in Australia and New Zealand if advisory statements on packaged alcohol were introduced, drawing on domestic and international experience of alcoholic beverage labelling and comparable public health initiatives, within the context of the Australian National Alcohol Strategy and New Zealand National Drug Policy.

The project involved a literature review, which was based on a systematic search for available and relevant literature on the effectiveness of alcohol warning labels (advisory statements). In addition, individuals who had published research in the area were contacted via email and asked to identify relevant publications and to recommend other suitable authors/organisations for the research team to contact. The literature was critiqued in relation to methodological rigour, reliability, validity and generalisability. A reference group reviewed the methodology adopted for the project and the draft and final reports.

It was noted that despite the fact that over 20 countries have adopted mandatory alcohol warning labelling, there is only a relatively small research base with which to inform evidence-based reviews of the effectiveness of this approach. Most publications have come from the U.S.

This report includes a brief discussion of alcohol consumption and related harm in both Australia and New Zealand, an outline of models that inform responses to this harm and discussion of the range of factors that interact, to influence the development and maintenance of harm. Most models of alcohol related harm, and responses to this harm, identify a range of factors that interact to protect from and/or increase the risk of alcohol related harm, leading to a conclusion that isolated strategies are not likely to have impact – multifaceted approaches are needed.

In New Zealand and Australia such multifaceted approaches have been adopted, typically broadly categorised as harm, demand, and supply control strategies. Governments in New Zealand and Australia have developed comprehensive alcohol policies and approaches that reflect the acknowledged complexity of alcohol use in society. New Zealand is finalising a National Alcohol Action Plan and Australia has developed the National Alcohol Strategy 2006-2009. Recently the Australian Government announced a National Binge Drinking Strategy to address heavy episodic drinking among young Australians.

It is generally acknowledged that strategies to reduce alcohol-related harms work best in combination – particularly when they complement each other. It is also the case that given the complex nature of alcohol related problems, the range of initiatives which may occur concurrently across different sectors (e.g. police, health, policy), and measurement problems and design limitations among research evaluations can make it difficult for analysts to pinpoint the specific effects of one intervention among a potential suite of other activities - that is, it is generally not possible to disaggregate the effects of alcohol warning labels from other activities or events. The role of alcohol warning labels are considered in this context.

The role of warning labels

There have been recent calls to include warning labels on alcohol packaging in Australia and New Zealand, an approach adopted in some other countries. Warnings and consumer advice on packaging are common on diverse products, from pharmaceuticals to swimming pool equipment.

Various theoretical perspectives have been considered in understanding the influence of health communications, including warning labels. The Health Belief Model is one such perspective. Research into the Health Belief Model indicates that giving information about the risks of a particular behaviour may not be sufficient to result in behaviour change. Other theoretical approaches reach similar conclusions. They predict that a warning label, or other media, communicating messages about health risks may be noticed and understood in general, but might not be interpreted by an individual as having personal relevance. For example, self-serving optimism may increase the sense that the risks are only pertinent for other people. The various models indicate that health messages will need to be perceived as personally relevant before they are considered. Health information in a warning label may then be recognised by an individual, but other strategies, such as interpersonal discussion about risk and the individual having access to strategies that will assist them making any behavioural adjustment will be required. This suggests that health communication, such as warning labels, will not be sufficient to ensure behaviour change – other strategies will be required.

In recent reviews of the effectiveness of warning labels on a range of products, it has been concluded that their effectiveness can be measured in numerous ways. The criteria for assessing the effectiveness of warning labels have included:

1. Attention (the ability to attract the attention of the consumer);
2. Reading and comprehension;
3. Recall of the message;
4. Judgements of the product's risks and hazards; and,
5. Behavioural compliance with the message.

There are potential moderators of a warning label's effectiveness. These include:

1. *Vividness-enhancing characteristics*, such as font size, colour, spacing, level of specificity and symbols;
2. *Warning location*, such as whether the information is placed on or off the product (e.g. point of sale warning labels versus warning labels on the package), on the front or on the back of the package;
3. *Familiarity*, such as how familiar a consumer is with a product may also impact on whether or not a consumer notices a warning label;
4. *Age*, whereby cognitive abilities change with age and this may influence recall of label information; and,
5. *Product type*, (e.g. warning labels on product known to carry risks, such as pharmaceutical drugs versus products that have a more recent risk profile, such as sun beds)

There is some debate about legitimate expected outcomes regarding warning labels. This debate should be related to theoretical considerations, as indicated in the Health Belief Model and models that underpin our understanding of alcohol problems. Some will claim that if a warning label has not resulted in a change in behaviour, it is not effective. Others have commented that if a warning label successfully informs consumers of potential risk, even if they do not act on that information it can, at least in part, be judged effective. For example, two key researchers on this issue have noted that:

“Some warnings are designed to convey information about a product's potential risks, and as long as consumers understand the risk involved, the choice of behaviour is ultimately up to them. In addition, if consumers accurately recall the dangers associated with the consumption of a particular product but choose to ignore them, the warning label has still effectively served its purpose.” (Argo and Main 2004, p.205).

Outcome of the current review

Forty original research studies were located that specifically investigated the effectiveness of warning labels on alcoholic beverage containers. All but four of the papers were based solely on data from the U.S. Of the remainder, two studies were based on a comparison of U.S. and Canadian data, one was based on data from the U.S. and Australia, and another paper was from Israel.

This review concluded, as have past reviews by others, that the majority of available research had significant limitations:

- Most studies did not include adequate control observations and thus, factors other than the alcohol warning labels may have influenced outcomes;
- Most studies originated from the U.S. raising questions about generalisability to other countries;
- Many studies had relatively small and/or non-representative samples (e.g. samples of marketing students, African-American pregnant women) reducing the generalisability of the results;
- Amongst those studies that have been well designed, most have relied on self-report with no confirmation of the reliability of these measures;
- The current research base does not allow a comparison between potential impacts of voluntary and mandated alcohol warning labels;
- The current research base does not extend to the function and effects of warning labels in licensed drinking settings (e.g. hotels, nightclubs, restaurants) where alcohol may be consumed from glassware and in the absence of its original packaging (e.g. tap beer, wine consumed by the glass);
- No research was identified which examined the potential effects that alcohol warning labels may have on beverage preferences and substitution effects with alternative substances;
- There is insufficient evidence to identify and assess potential adverse outcomes of alcohol warning labels.

Using the measures of effectiveness described above, the research evidence indicated:

- A reasonable consensus that people are able to recall the presence of warning labels (even though it has been observed that U.S. labels are not particularly noticeable and do not stand out from their background);
- A substantial proportion of consumers, including younger consumers, who have reported that they had seen an alcohol warning label could recall the message;
- Only a small body of research indicated that warning labels have some impact on judgements about risks associated with alcohol consumption;
- There was insufficient assessment of whether consumers understood the information conveyed on warning labels;
- There is a very limited evidence base about the impact of alcohol warning labels on behaviour. Some research indicates that the introduction of alcohol warning labels in the U.S. was associated with a self-reported increase in the likelihood of respondents having a conversation about the risks of alcohol. There is also some evidence that the warning labels reportedly prompted pregnant women to discuss the topic and the more types of warnings that respondents were exposed to (on advertisements, point of sale promotions etc) the more likely they were to discuss alcohol associated risks. However, there was very limited support for other behavioural change. One study indicated that exposure to the warning message led to a reported reduction in alcohol consumption amongst pregnant women who were light drinkers, and pregnant for the first time. One report indicated that people who had seen the warning label were more likely to drive after drinking too much, but also indicated that they had deliberately not driven after drinking during the past year. Another report indicated that while exposure to one message source (no distinction was made between the efficacy of different sources) did not result in any significant behaviour change, exposure to two and three different message sources (warning label, poster, advertisement) did lead to a significant reduction in consumption due to health concerns. Finally, a recent report indicated an association between exposure to warning labels and propensity to intervene in alcohol related risks among others (e.g. strategies to reduce driving by intoxicated individuals).

There a number of gaps in the evidence. This included the following:

- There is a paucity of discussion about the models that underpin alcohol warning labels. Limited evidence, and sometimes conflicting findings, do not allow adequate testing of the models that have been considered;
- There is little evidence that can guide decisions, if they were to be adopted, about the nature and content of warning labels that are most effective (e.g. location, appearance, message);
- Evidence about behavioural impact is largely lacking;
- Strong conclusions about populations who are most responsive and least responsive to health communication strategies such as alcohol warning labels are not possible; but there is some evidence to suggest that younger age groups and heavier drinkers are more likely to recall warning labels;
- Conclusions about how best to link alcohol warning labels to other strategies are not informed by the evidence;
- Little attention has been paid to unintended and adverse outcomes; and,
- It is not possible to estimate cost, and in conjunction with other limitations identified above, cost-effectiveness/efficiency of the approach cannot be estimated.

The table below summarises the findings of the review.

Finding	Level of support from the available research
Over time more people will become aware of the existence of warning labels	Moderate
Depending on the message and the characteristics of the individual, people who are aware of the presence of warning labels are able to recall the messages included	Moderate
Warnings on the link between alcohol and the risks of drinking during pregnancy are believable	Moderate
Warnings on the link between alcohol and the effect of alcohol on driving impairment are believable	Moderate
Those people who see labels are more likely to have conversations about the risk of drinking and driving	Moderate
Those people who see labels are more likely to have conversations about the risk of alcohol during pregnancy	Moderate
Some groups, such as young people and heavier drinkers, may be more aware of the warning labels	Moderate
Exposure to more than one message source (e.g. warning label, poster, advertisement) has a greater impact on knowledge and behaviour	Weak-Moderate
Warning labels had no effect on intentions regarding future consumption	Weak-Moderate
Recall of warning labels may be associated with an increase in the proportion of people driving when they knew they would be in trouble with the police and conversely an increase the proportion who report they had limited their drinking because of driving	Weak-Moderate
Warning labels may be associated with a collateral intervening to deter another person from drinking and driving	Weak-Moderate
Warning labels are associated with a reduction in consumption amongst women pregnant for the first time	Weak
Warning labels are associated with an increase in rating alcohol as beneficial and increase intentions to drink	Weak

It was concluded that the available evidence allows only tentative suggestions about the potential impact of adopting alcohol warning labels in New Zealand and Australia:

- Within a two- to three-year period, the majority of drinkers will have noticed the warnings;
- Younger people and heavier drinkers may be more likely to notice the warnings;
- Of those who notice the labels, approximately 50% will be able to recall the message (this will vary depending on the content of the message);
- There is likely to be an increase in the number of conversations that people will engage in on the message topics;
- It is less clear whether any behaviour change will occur. However, it is possible that:
 - People who see the labels *may* report that they have limited their drinking when driving;
 - If labels are complemented by point of sale, posters and other message sources, people *may* report a reduction in the consumption;
 - Those who can recall a drink driving message *may* intervene to deter other people from drinking and driving;

It is important to note that these possibilities are based on evidence of the effects of U.S. warning labels, which were small text based messages that were not clearly linked (in the research reports) to other strategies. It is not possible, from the research, to estimate the costs of adopting warning labels, nor to estimate unintended adverse outcomes. Consequently, it is not possible to estimate cost-effectiveness/efficiency.

The conclusions drawn by this review should be considered in the following context:

- The majority of observed effects have been modest. This is perhaps not surprising given that follow-up in most research has been short-term (6 months or less). Such a brief period of time may not be sufficient for individuals to act on the information contained in the label;

- Warning label content has focussed primarily on a narrow band of messages, such as drinking and driving, operating machinery, information about alcohol content/standard drinks, pregnancy/birth defects and less commonly chronic health effects;
- Most evidence indicates that alcohol warning labels have most impact on message recognition and there is some evidence about impact on conversations about risk. There is very little evidence about impact on behaviour. This is consistent with predictions that may be made under a Health Belief Model. Other strategies will be required to translate any impact of warning labels into changes in risk behaviour; and
- It has been commented that most alcohol warning labels currently in use are likely to have limited impact, given their location, nature and style. The quality of alcohol warning labels compare unfavourably to tobacco warning labels, where there is a stronger body of evidence about effectiveness.

Tobacco warning labels

It is acknowledged that tobacco is not the same product as alcohol and that there are distinctions in how communities perceive and respond to problems associated with the two substances. However, there may be lessons to be learned from experiences with tobacco warning labels, which have been found to significantly influence smokers' understanding of the risks of tobacco use and on their reported consumption levels.

Evidence from New Zealand, Australia and elsewhere indicates that the content, style and presentation of tobacco warnings can markedly affect how noticeable and memorable warnings are, and also influence the extent to which consumers understand, believe and feel empowered to act upon the information they contain. Evidence indicates that tobacco warnings are most effective when they:

- Promote negative attitudes to smoking, while also promoting positive attitudes to quitting;
- Combine strong identification of risk with information about how risk can be avoided;
- Convey a sense of the negative social as well as negative health consequences;

- Focus on the relevant attitudes of the target groups;
- Increase perceived self-efficacy;
- Promote discussion about smoking among smokers friends and family; and,
- Confront self-exempting beliefs.

Based upon the body of tobacco research, it is evident that:

- Obscure text warnings appear to have minimal impact. Frequently alternated messages that depict health risks in a vivid and emotionally arousing manner and in clear simple language have the greatest impact;
- Pictures are more effective than text (even when text is clear and simple);
- The bigger the warning label the better. Smokers are more likely to recall larger warnings, with bigger warnings associated with greater appreciation and acceptance of risk; and,
- Warning labels on the front of tobacco packaging is more effective. Evidence indicates that smokers will have better recall of warning labels that appear on the front, rather than the side of packages.

In summary, research in the tobacco control area highlights that for warning labels to be most effective in increasing awareness and perceptions of risk, and prompting behaviour change, they need to be prominent, simple, and visually graphic. The relevance of these findings to alcohol has not been tested, nor have such graphic and large warning labels been used and evaluated.

Conclusion

To date, alcohol warning labels that have been adopted are relatively limited in nature (e.g. at least compared to tobacco warning labels) and have addressed only a small range of alcohol related harms. The evidence base for alcohol warning labels is limited: there is reasonable consensus that alcohol warning labels are noticed and recalled but less evidence that they have impact on behaviour. There have only been a few rigorous long-term and extensive evaluations of the impact of warning labels on harms associated with alcohol use and there is little evidence about their impact on

behavioural intentions and behaviours specifically related to risky or high risk alcohol use.

The alcohol warning label evidence currently available does not support bold unqualified conclusions. Taking this lack of certainty into account, this report has highlighted a number of important issues for consideration. The following discussion *does not* propose that alcohol warning labels should be adopted. The aim is to highlight issues that will be important to consider *if* warning labels were to be adopted.

1. Evidence from other domains, especially tobacco use, provides some useful information. This evidence indicates that to have impact warning labels should be prominent, graphic and should incorporate images as well as text. Evidence from the tobacco arena indicates that messages are most effective when mandatory and when messages and images are frequently changed and alternated. Such approaches (at least in relation to prominence, use of images that are graphic) have not commonly been adopted in relation to alcohol warning labels and thus, of course, the impact of such approaches has not been evaluated. It is possible, given that both alcohol and tobacco are regulated, legal and psychoactive drugs; that experience from tobacco control may be generalisable to alcohol. Nonetheless, caution is indicated as there is currently no evidence to support such generalisation. In addition, there are important distinctions between tobacco and alcohol (e.g. no dose of tobacco is accepted as low risk, which is distinguished from perceptions of alcohol consumption). In the context of the above discussion, the apparently limited evidence about the impact of alcohol warning labels might be interpreted as “a paucity of opportunities for investigation and evaluation” as opposed to one of “no impact.”

2. It can be difficult to differentiate between the specific effects of warning labels and other concurrent activities that aim to prevent and reduce alcohol related harm. Models about health communication and preventing and reducing alcohol related harm and related evidence suggest that interventions such as warning labels are likely to be most effective when part of a broader strategy. If alcohol warning labels were to be adopted, they should be consistent with, and where possible linked to, current

alcohol policy and related strategies in Australia and those that are identified in the impending New Zealand policy. In relation to heavy episodic drinking among youth for example, **if** warning labels were adopted they might focus on short-term risks associated with intoxication that are relevant to this population (e.g. unwanted pregnancy, violent assault) and should complement other concurrent strategies and activities (e.g. strategies to avoid risk, alcoholic beverage price changes, enforcement of underage purchase/drinking restrictions, potential restrictions on alcohol promotions).

This suggests the need for a coordinated approach. That is, if alcohol warning labels are adopted, it will be important to ensure communication among those tasked with oversight of the approach (e.g. FSANZ) with stakeholders (such as government agencies) who are responsible for implementing other alcohol public health strategies. Thus, for example, warning labels aimed at reducing the risk of alcohol related injury among young people should preferably be part of a broader and coordinated set of evidence-based strategies to reduce heavy episodic drinking among young people (e.g. supply control and demand reduction approaches).

3. Available evidence from the alcohol and tobacco research domains suggests that the content of any alcohol warning labels is likely to be influenced by the following:

- (i) The evidence about alcohol related harms, focussing on the consequences that are more prevalent and costly, and amenable to intervention.
- (ii) The capacity to effectively communicate information/advice about a specific issue in a warning label.
- (iii) The relationship between the label content, government policy, strategic directions and broader strategies.
- (iv) Characteristics of the consumers/target audience and target behaviours. The evidence indicates that there may be diverse needs and responsiveness of intended audiences.
- (v) Drinking behaviour of the consumers/target audience. For example, if drinking largely occurs in licensed premises, consumers may not be exposed to warning labels attached to packaged liquor. Alternative/additional health communication approaches may be required.

A significant proportion of the alcohol related burden arises from the short-term effects of alcohol. These risks include drinking and driving and operating machinery – issues which have commonly been addressed by alcohol warning labels introduced overseas. Currently, in Australia and New Zealand, there is also significant concern about other common acute risks such as violence, intentional (e.g. suicide) and unintentional injury (e.g. falls, drowning) and alcohol overdose. If alcohol warning labels are considered in Australia and New Zealand, there would be merit in considering the full range of concerns about the acute adverse effects of alcohol. Emerging Australian and New Zealand evidence about the collateral consequences of alcohol consumption (e.g. child neglect, domestic violence) might also indicate potential alcohol warning label content.

4. Consideration of warning labels may have implications for a wide range of stakeholders, including community members, governments, industry and public health experts and a judicious planning phase would include substantial consultation with such groups. Sound choices regarding labelling content and design are most likely to arise in the context of an evidence-based decision making process that includes health, behavioural science and social marketing expertise.

5. If adopted, alcohol warning labels should be coupled with adequate investment to effectively evaluate their impact. Drawing on evidence to date and taking current knowledge gaps into account, this should ideally include consideration of the following:

- (i) Potential cost/benefit of the approach, to industry, the community and to government;
- (ii) Acceptability, credibility and believability of message content;
- (iii) Quality baseline data about target behaviours, including: a) knowledge about risk; b) drinking behaviour; c) risk taking relevant to target behaviour (e.g. drink driving); and d) public support for and understanding of aims of alcohol warning labels;
- (iv) Level of exposure of consumers and target audiences to alcohol warning labels;

- (v) Impact of alcohol warning labels on: a) knowledge about risk/judgement of the product's risks and hazards; b) behavioural intention relating to drinking and associated risk taking; and c) behavioural compliance or actual drinking behaviour and related risk taking.

Highest value would be obtained from evaluation which was, as far as possible, able to assess the impact of warning labels in isolation and as part of an overall strategy (e.g. acceptability and believability could be assessed in isolation, but behavioural impact might be assessed as part of an overall intervention).

Chapter 1: Introduction

1.1 Aims

This report has two primary aims. These are:

1. To provide a comprehensive and objective review of the available evidence regarding the effectiveness of advisory statements on packaged alcohol products, drawing on domestic and international experience of alcoholic beverage labelling and comparable public health initiatives within the context of the Australian National Alcohol Strategy and New Zealand National Drug Policy; and,
2. To provide estimates of possible changes in outcomes which may be used to measure the effectiveness of labelling in Australia and New Zealand if advisory statements on packaged alcohol were introduced, drawing on domestic and international experience of alcoholic beverage labelling and comparable public health initiatives, within the context of the Australian National Alcohol Strategy and New Zealand National Drug Policy.

1.2 Background

FSANZ is a statutory authority constituted by the Food Standards Australia New Zealand Act 1991. FSANZ's aim is to protect the health and safety of people in Australia and New Zealand through the development of effective food standards. FSANZ does this collaboratively with all Australian governments, the government of New Zealand and with industry, consumer and public health stakeholders.

FSANZ is responsible for developing and maintaining the Australia New Zealand Food Standards Code. This code has standards which regulate the labelling and composition of food including alcoholic beverages.

This report originates from a Council of Australian Governments' (COAG) request to FSANZ to consider mandatory health warnings on packaged alcohol.

Chapter 2: Methodology for preparing the report

This report does not represent a series of meta-analyses, but is a comprehensive review that is based on individual original research papers, meta-analyses and reviews.

The literature review involved a systematic search for available and relevant literature on the effectiveness of alcohol warning labels. As the 1988 Alcoholic Beverage Labeling Act (P.L. 100-690) in the U.S. did not require alcoholic beverages product manufacturers to include alcohol warning labels until November 1989, the initial search for relevant published material entailed scanning: 'Informit', 'Pubmed', 'PsychInfo', 'ScienceDirect', 'ProQuest' and 'Medline' databases for literature published in English from 1990 until October 2008. These databases covered drugs and alcohol, health, psychology and marketing. When searching for literature, key words included: 'alcohol labelling', 'warning labels', 'effectiveness of warning labels', 'tobacco and warning labels', 'effectiveness of alcohol and warning labels', 'pregnant women and warning labels', 'alcohol and warning labels', 'health warnings' and 'health warning labels'. Grey literature and unpublished information were identified using general internet search engines such as Google and Google Scholar and government/health websites e.g. National Drugs Sector Information Service (NDSIS- formerly ADCA). A second search of the literature using the same methodology as above was undertaken that covered 1989 till 1990. The only new paper that was identified during this search was a discussion paper by Engs (1989). Given that the first mandated alcohol warning labels occurred at the end of 1989, it is not anticipated that there are earlier studies of the impact of such approaches.

In addition, nine individuals who had published research in the area were contacted via e-mail and asked to identify other relevant publications and to recommend other suitable authors/organisations for the research team to contact. Based upon the recommendation from FSANZ, the Alcohol Advisory Council of New Zealand were also contacted and asked to provide any material that might be deemed of relevance to the investigation e.g. recent papers and publications on the topic of alcohol labelling.

The original email sent to authors is included below:

“A small consortium with representation from the National Drug Research Institute, National Drug and Alcohol Research Centre, the Public Health Advocacy Institute (WA) and the Drug and Alcohol Office are reviewing the nature, provenance, impact etc of alcohol warning labels (i.e. on alcohol packages/bottles etc.) for Food Standards Australia and New Zealand. We are trying to identify relevant literature using the regular approach but also contacting colleagues and those of you who have already published in the area. Anything you can direct us to in relation to the topic would be fantastic. The only limit would be that publications need to be in English (at least the abstract). If you know of anyone else who may be able to provide information on the topic I would appreciate you forwarding to them a copy of this email or letting me know so that I can contact them directly.

Thank you very much.”

In addition, based upon feedback from FSANZ on the first draft of the report the Directors of two government alcohol agencies in the United Kingdom were contacted to provide an update on legislative issues regarding alcohol warning labels and asked if they were aware of any new available research on the topic. This combination of a snowballing and targeted methodology resulted in eighteen individuals being identified who were potentially knowledgeable about the topic. However, as these individuals were not asked for permission to publish their names, it is not appropriate that they be identified in the report. The eighteen individuals contacted were from university (n=14), government (n=3) and industry based organisations (n=1). Six of the contacts were from Australia, three from New Zealand, three from Europe, four from the United States (U.S.) and two were from Canada.

Using the combined approach of a review of the literature, as discussed above, and seeking advice from the key individuals (discussed above) about literature that has specifically investigated the effectiveness of alcohol warning labels, forty original research studies were located (using the data bases accessible to the Drug and Alcohol Authority and Curtin University of Technology) that specifically investigated the

effectiveness of warning labels on alcoholic beverage containers. In addition over 40 general review/discussion papers were also located (See Appendix 4). The majority of available reviews reached similar conclusions, based on evidence available at the time. Four recent reviews, which include the more recent literature, were examined in some detail.

Each research paper was critiqued with regard to the following criteria:

- Strength and appropriateness of methodological design (e.g. cross-sectional versus longitudinal data, use of matched pairs versus unmatched controls);
- Sound external validity (e.g. representative/random sample, generalisability of results, adequate sample size, consideration of confounding and historical factors, plausibility of assumptions); and,
- Sound internal validity (e.g. validity and reliability of measurement instruments, random allocation of subjects: consideration of maturation and selection effects).

The methodology for collecting literature, the design and structural plan and all drafts of the report had input from a reference group that included: Professor Steve Allsop (Director, National Drug Research Institute (NDRI), Curtin University of Technology), Associate Professor Tanya Chikritzhs (Senior Research Fellow, NDRI), Professor Richard Mattick (Director, National Drug and Alcohol Research Centre), Professor Mike Daube (Director, Public Health Advocacy Institute, Western Australia), and Mr Gary Kirby (Director, Prevention and Workforce Development, Drug and Alcohol Office, WA). The reference group received each draft of the report, made comment and recommendations and provided expert input on particular issues relevant to their expertise (for example, Professor Daube's expertise was instrumental in the development of the two chapters on tobacco health warnings; Professor Chikritzhs provided input on patterns of alcohol use and related harm, Mr Kirby's advice was sought on young people's awareness of risks associated with alcohol consumption).

The current report has followed the principles of evidence-based medicine modified for the purposes of preparing a report on alcohol warning labels. The approach is defined as "*the conscientious, explicit and judicious use of current best evidence in*

informing decisions about alcohol policy” (Anderson 2007). In adopting such an approach the sentiments of Sir Muir Gray (1999) are noteworthy: “The absence of excellent evidence does not make evidence-based decision making impossible; what is required is the best evidence available, not the best evidence possible”.

Although the report represents a comprehensive review of the evidence-based literature, it has been dependent on what is available. In light of the fact that over 20 countries have now adopted mandatory alcohol labelling, as will be indicated in the detailed review below, it is paradoxical that so little research is available to evaluate the behavioural effectiveness of this potentially important social marketing approach. As the overwhelming majority of available publications are from the U.S., it has not been possible to provide information that is necessarily generalisable to other countries, cultures and populations. Nor has it been possible to identify research that has investigated the impact of alcohol warning labels on burden of disease, disability adjusted life years (DALYs) or economic impact.

2.1 Structure of the report

The report commences with a discussion of alcohol use in both Australia and New Zealand, including reference to federal responses and alcohol strategies implemented in each country. The focus shifts to a brief discussion of theoretical frameworks underpinning generic and alcohol warning labels and exploration of definitions of effectiveness. An overview of binge drinking in Australia and New Zealand with reference to the level of awareness and knowledge amongst young people concerning the risks of consuming alcohol will then be covered. Subsequently the report examines the history of alcohol warning labels, including a brief overview of the use of warning labels in all other English speaking OECD countries. This concludes with a synopsis of the current official position on alcohol warning labels of the European Union (EU). Specific examples of alcohol warning labels are included and information provided on the specific wording used in labels from a number of countries.

Next the report concentrates on the available literature that has specifically investigated the effectiveness of alcohol warnings on awareness, perception of risk and behaviour change. As tobacco health warnings have been commonplace in both Australia and New Zealand for more than thirty years (Smokefree Coalition 2008) and there exists a plethora of research on the effectiveness of such labels, this literature will be reviewed. It is acknowledged that there are differences between alcohol and tobacco, but there is a substantial literature regarding tobacco that may have relevance for alcohol.

The report then addresses the issue of possible changes in outcomes which may be used to measure the effectiveness of labelling in Australia and New Zealand following any potential introduction of advisory statements on packaged alcohol, drawing on domestic and international experience of alcoholic beverage labelling and comparable public health initiatives, within the context of the Australian National Alcohol Strategy and New Zealand National Drug Policy.

The report concludes with a discussion that brings together the above elements and closes with identification of key issues that are important in any discussion about alcohol warning labels.

Chapter 3: Public health and the role of warning labels

3.1 Alcohol use in Australia and New Zealand

Apart from caffeine, alcohol is the most widely used psychoactive recreational drug in Australia and New Zealand (Australian Institute of Health and Welfare 1999; Australian Institute of Health and Welfare 2002; Australian Institute of Health and Welfare 2005; Australian Institute of Health and Welfare 2007; Ministry of Health 2007). Based upon national data from the 2004 Health Behaviours Survey, 83% of the New Zealand population aged 15 years and over and 74% of 15 to 17 year olds had consumed alcohol in the previous 12 months (Ministry of Health 2007). Among New Zealanders aged 12–65 years, who had consumed alcohol in the last 12 months, 14.7% consumed large amounts of alcohol at least once a week (for males this represented more than six standard drinks on one drinking occasion; for females this represented more than four standard drinks on one drinking occasion). Overall, an estimated 15.4% of New Zealand drinkers consumed alcohol seven or more times a week on average in the last 12 months and approximately one in six New Zealand drinkers (16.2%) consumed alcohol on average four to six times a week. Amongst 25-34 year old men and women, 12.2% reported drinking 7 times or more per week and 17.9% drank 4-6 times per week (no gender breakdowns were presented by age group) (Ministry of Health 2007). Data from large-scale New Zealand surveys indicate that while Māori are less likely to drink alcohol and drink less often, they drink more heavily on a typical drinking occasion when compared with non-Māori (Ministry of Health 2007).

In 2007, the average Australian aged 15 years or older consumed 9.88 litres of pure alcohol (Australian Bureau of Statistics 2008). In Australia the net government revenue from alcohol taxation increased from \$3.6 billion in the period 1995-96 to \$5.1 billion in 2004-05 (Australian Institute of Health and Welfare 2007). The 2007 National Drug Strategy Household Survey (NDSHS) estimated that 83% of the Australian population aged 14 years and over had consumed at least one full serve of

alcohol in the past 12 months and 8% drank alcohol on a daily basis (Australian Institute of Health and Welfare, 2008a).

For many people alcohol forms part of an enjoyable and healthy lifestyle (National Health and Medical Research Council 2001). Conversely between 1992 and 2001, over 31,000 Australians died from alcohol-caused injury and disease, and in the eight years between 1993/94 and 2000/01 over half a million hospitalisations in Australia were caused by alcohol (Chikritzhs, Catalano, Stockwell, Donath, Ngo, Young, and Matthews 2003). According to Connor, Broad, Rehm, Vander Hoorn and Jackson (2005) alcohol consumption was estimated to contribute to 1,037 deaths in New Zealand in the year 2000. The majority of these alcohol-related deaths in New Zealand were due to injuries (51%), cancer (24%) and other chronic diseases (25%).

In 2004-05, Collins and Lapsley (2008) concluded that based upon crime, violence, treatment costs, loss of productivity and premature death, alcohol cost the Australian community \$15.3 billion. In New Zealand, research by Easton (2002) indicated that the total social costs from alcohol were between \$1 and \$4 billion dollars per year.

3.2 Responses to alcohol related harm

Alcohol consumption does not exist in isolation from other individual lifestyle behaviours (e.g. smoking, diet, exercise), cultural or environmental influences (Edwards et al 1994). As such, governments have implemented a range of strategies for reducing alcohol related harms e.g. drink driving legislation, random breath testing, regulatory liquor licensing laws, hypothecated taxation, and thiamine supplementation. These strategies typically fall into one of three broad categories: harm, demand and supply reduction strategies. Included among a range of harm and demand reduction strategies are alcohol guidelines providing information on low risk drinking, school and community based education strategies, and warning labels on packaged alcohol. The implementation of a multifaceted approach by governments in Australia and New Zealand mirrors the complexity of alcohol use and encompasses many of the elements of the Public Health system model.

This model (see Figure 1) conceptualises the determinants of health and alcohol use on a continuum from macro to micro, acknowledging the range of prevention activities that can be adopted. These strategies range from international approaches to strategies that focus on the individual (Loxley et al 2004).

PREVENTION ACTIVITY	MECHANISMS OF ACTION	COMMUNITY LEVEL	CONTEXT
Diplomacy Treaty negotiation	Treaties and conventions Enforcement Policy coordination Border interdiction	INTERNATIONAL	<i>Economic imbalances 1st to 3rd world; History and geography Global culture portrayals (e.g. film)</i>
Advocacy Lobbying Expert advice and consultancy Health promotion	Policies, laws, regulations Law enforcement Drug control (e.g. scheduling pharmaceuticals) Taxes and excise Media Health and welfare spending Border interdiction	NATIONAL	<i>Economic factors Political priorities Health and welfare levels and structures Employment and education levels National values and norms Media portrayals</i>
Public education Supporting community action Research	Policies, laws and regulations Law enforcement Electronic media Taxes and excise Licencing, education policy Health and welfare spending	STATE / TERRITORY	<i>Australian Government State/Territory relations Health and welfare levels and structures; Employment and education levels; Political priorities Regional-values and norms Media portrayals; Economic factors</i>
	Local council By laws, police Community groups Schools Local print media Community radio	LOCAL COMMUNITY	<i>Local issues Community history of drug costs and benefits Cultural factors</i>
Education, advice and consultancy supporting organised labour and employer harm prevention initiatives research	Organisational policy EAP programs Education of health providers	ORGANISATIONAL/INSTITUTIONAL	<i>Organisational culture Management policy</i>
Supporting group action and advocacy Supporting treatment staff to do prevention Establishing and supporting outreach and peer education Research	User advocacy group Peer education Outreach Treatment	GROUP/INDIVIDUAL/COLLECTIVE	<i>Group identity, norms, beliefs and respect Shared knowledge, skills and experience</i>
	Word of mouth Material N&Ss Written disposal guides	INTERACTION	<i>Immediate social and physical context Availability of equipment Transactions; Negotiations</i>
		ACTION	<i>Drug use and its costs and benefits</i>

Figure 1: Systems approach to prevention as cited in Loxley et al 2004.

Another useful framework for contextualising appropriate responses to alcohol use is the Risk and Protection model (Loxley et al 2004, see Figure 2). This model acknowledges that alcohol risk and protective factors originate within both family and educational systems but are also influenced by community and cultural factors.

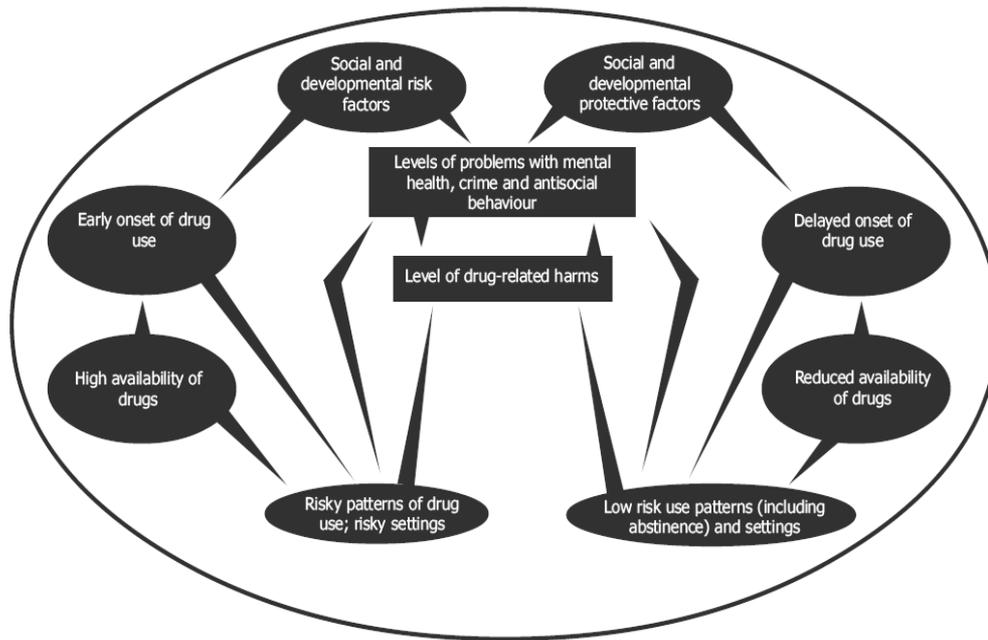


Figure 2: Risk and protection model as cited in Loxley et al 2004.

Both federal governments in New Zealand and Australia have developed comprehensive alcohol strategies that reflect the acknowledged complexity of alcohol use in society. New Zealand is finalising a National Alcohol Action Plan (Ministry of Health, 2008), that has as its aim the reduction of alcohol-related social, economic, health and environmental harms. To achieve this aim, New Zealand has developed a framework for action (See Figure 3) including five primary goals which underpin the vision and aims of the plan and provide areas of focus. These goals relate the following areas:

1. Individuals, families and whanau;
2. Community and environment;
3. Workforce and skills;
4. National frameworks; and,
5. Information, research and communication.

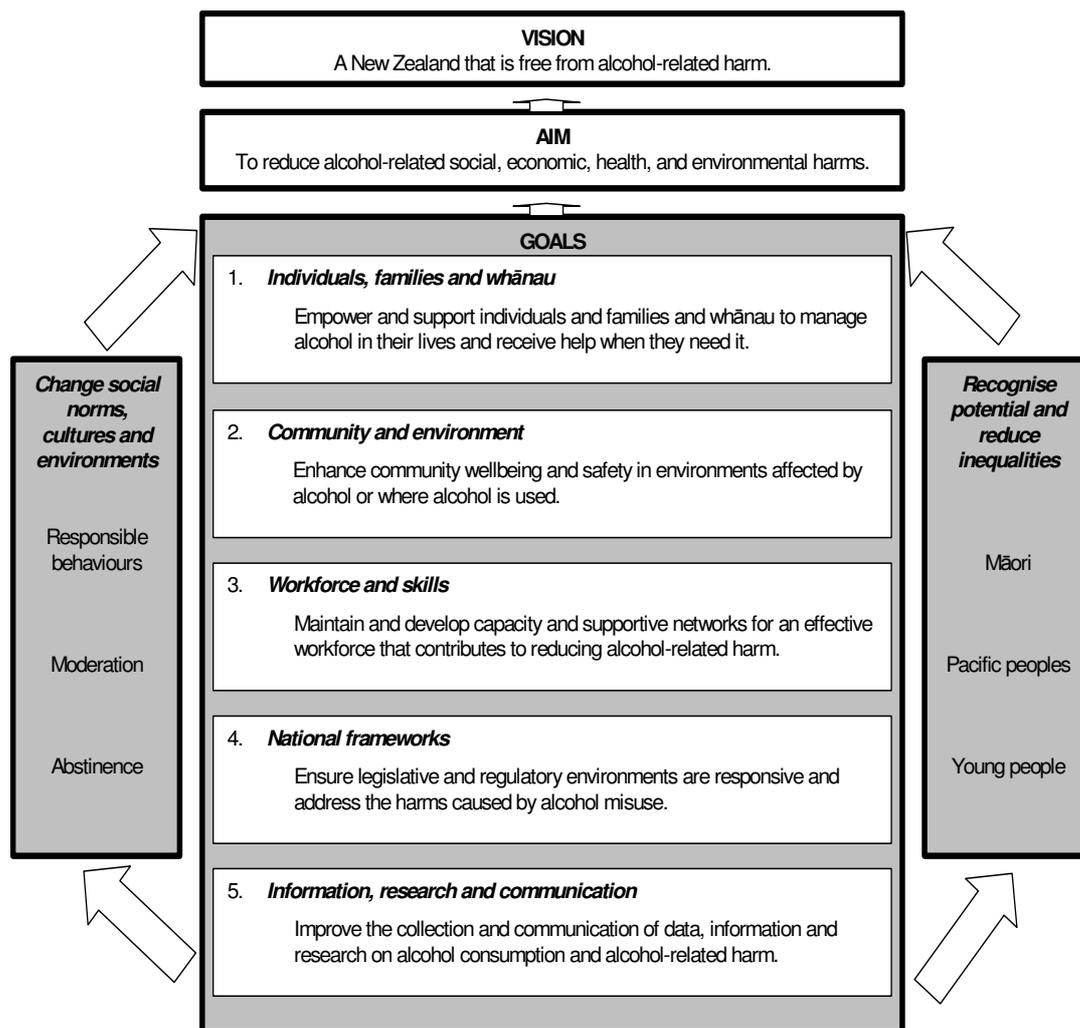


Figure 3: New Zealand Framework

Similarly, Australia has developed the National Alcohol Strategy 2006-2009 (Commonwealth of Australia 2006). The goal of the National Alcohol Strategy is to prevent and minimise alcohol-related harm to individuals, families and communities in the context of developing safer and healthy drinking cultures in Australia. The following four priority areas have been nominated as the focus of the National Alcohol Strategy 2006-2009:

1. Intoxication
2. Public Safety and Amenity
3. Health impacts
4. Cultural place and availability

An underlying premise of the Australian National Alcohol Strategy 2006-2009 is that cultural place and the availability of alcohol represent major determinants of behaviours that can lead to alcohol-related harm. The strategy also acknowledges that although many determinants, behaviours and outcomes of alcohol-related harm can be identified, many are inter-related and synergistic (Commonwealth of Australia 2006). In March 2008, the Federal Government in Australia also announced a National Binge Drinking Strategy to address binge drinking among young Australians. This Strategy includes investment in community level initiatives to confront the culture of binge drinking, early intervention to assist young people and advertising that confronts young people with the costs and consequences of binge drinking (Prime Minister 2008).

A recent review (Brand, Saisana, Rynn, Pennoni and Lowenfels 2007) of alcohol policies in 30 OECD countries ranked Australia as fifth and New Zealand as 11th overall. The study by Brand et al (2007) rated the alcohol policies in each of the 30 countries using a composite score that was based upon the adoption of a range of policies and strategies such as the physical availability of alcohol, prices, drinking context, alcohol advertising and road safety. The study also found that as alcohol policies increased in strength (i.e. effectiveness) alcohol consumption decreased. In short, theory about and responses to alcohol problems usually embrace a diverse number of approaches working in combination.

Various researchers have identified those interventions that have been identified as effective. These have included:

1. Higher alcohol taxation
2. Partial or complete bans on the advertising and promotion of alcohol
3. Measures to reduce drink driving
4. Brief interventions by primary care physicians to reduce hazardous alcohol consumption (Commonwealth of Australia 2008, Chisholm, Doran, Shibuya and Rehm 2006; Collins and Lapsley 2008).

It is generally acknowledged that Babor and colleagues (2003) have provided one of the more authoritative reviews on effective approaches to prevent and respond to

alcohol related problems. Below we provide a brief overview of their description of various strategies:

3.2.1 Tax/Price

Price is an important determinant of consumption and related harm. Alcohol taxation influences the price of alcohol over and above market forces (cost of production, supply etc.). Changes in taxation and other price changes (even small changes) have an effect on alcohol consumption. The evidence consistently indicates that higher priced alcohol is associated with per capita declines in consumption while lower priced alcohol is associated with increases in consumption. The evidence indicates that while there may be some variation in response to price changes across different groups' particular subgroups, such as young people and heavy drinkers, are sensitive to price changes.

3.2.2 Physical availability

The ease/difficulty of accessing alcohol can affect alcohol consumption. Of course, price can affect availability but there are other influences. Alcohol may be banned (e.g. through widespread/national prohibition or in a specific community/locale, as happens in some Indigenous communities in Australia). Controls may be placed on the type of alcohol available at certain times or events (e.g. at some sporting events there are controls on the types of alcohol available and alcohol content as well as limitations on how many drinks an individual can purchase at one time or bars may be only open for limited times). Limitations may be imposed on the days and hours of sale and, in some communities, there are restrictions on the nature of purchases (e.g. no bulk packaged liquor sales). Increases and decreases in the minimum purchase age have been associated with corresponding changes in consumption and related problems.

3.2.3 Drinking context

Not all drinking contexts are associated with the same level of risk. For example, overcrowded, late night venues with poor crowd control techniques have higher risk of a range of adverse outcomes (e.g. violence) than venues with well-trained staff who

comply with responsible server practices. It is not just a matter of training staff. Risk is reduced when training in responsible service of alcohol (e.g. not serving drunk people, not serving underage people, not engaging in promotions and other practices that encourage risky consumption, engaging skilled crowd controllers) is combined with enforcement strategies (e.g. through police and licensing authority activity).

3.2.4 Drink-driving

Random breath testing reduces drink driving, if there is a perceived high probability of detection. Certain individuals (such as those who record very high blood alcohol levels and who are alcohol dependent) who can be resistant to these strategies and additional approaches may be helpful (e.g., diversion to treatment, installation of devices that prevent car activation if a breath test is 'positive').

3.2.5 Alcohol promotions

Alcohol promotions have become diverse and more sophisticated as electronic and other communications have developed. Greater exposure to alcohol promotions has been associated with increased product recognition, more positive attitudes to alcohol and drinking and, in some studies, heavy drinking. Exposure to alcohol promotions may influence young people's knowledge, intentions and behaviour about drinking. Unlike alcohol availability, promotions have largely been subject to voluntary as opposed to statutory regulation. There are criticisms (based on evidence) that self-regulation has been ineffective. On the other hand, the evidence regarding statutory controls is inconsistent.

3.2.6 Education and persuasion

These include mass media communication, communicating guidelines on low-risk drinking and school- and college-based programs (e.g. information about the risks of alcohol; resistance skills). The acceptance of these programs appears high. While some well-resourced programs show modest effects, often these do not persist, particularly if the programs are conducted in isolation. They might be more effective when combined with other approaches (e.g. mass media campaigns can build community support for strategies to combat problems of intoxication).

3.2.7 Early intervention and treatment

A range of treatments for alcohol problems, including opportunistic and brief interventions for hazardous drinkers (e.g. in GP surgeries and hospitals or through self-help programs) or intensive treatments for people who are alcohol dependent, have been demonstrated to be effective. Widespread adoption of such approaches in primary health care settings remains elusive. For example, only a minority of GPs embrace brief interventions.

The models discussed above and the range of strategies discussed, indicate that approaches to respond to alcohol problems are often multifaceted. No single strategy is generally considered sufficient. This implies that strategies such as social marketing campaigns, school drug education, brief interventions and, in all likelihood, alcohol warning labels (if adopted) should be accompanied by other approaches that address the influence of factors such as alcohol availability, enforcement of drinking laws, alcohol promotion and parenting skills on young people's drinking behaviour. In short, integrated approaches that include a combination of strategies acting in synergy are more likely to be effective (Babor et al 2003, Commonwealth of Australia 2008). For example, while the evidence suggests that initiatives such as school based alcohol education programmes, community action programmes and mass media education campaigns, have in isolation limited impact on behaviour, there is evidence that each has a positive contributory effect and is thus important (Edwards et al 1994).

Research that highlights the complementary role of many public health initiatives indicates that a reductionist epistemology that focuses on the impact of single variables is important. However, it can preclude recognition that attributing causation to single variables assumes that individual strategies have incremental, additive effects, when in reality individual strategies are "*nurtured by the others, creating a synergism which produces*" a reduction in demand (Chapman 1993. p.432). Thus, the consensus is that drinking problems should be addressed through understanding and influencing the total and dynamic system, which comprises societal drinking and effective policies, and not addressed through an exclusive focus of picking off little pieces of the continuum (Edwards et al 1994).

While it might be desirable, from one point of view, to disaggregate the effects of particular approaches from other approaches (e.g. the effects of social marketing campaigns from all other alcohol strategies) the integrative nature of current models suggests there will be limitations to such approaches. In addition, methodological challenges have limited the possibility of disaggregating the effects of one approach from others.

It is within a context of a comprehensive public health strategy, that we now review and analyse the available evidence on the efficacy of alcohol warning labels in the Australian and New Zealand context. As will be seen in this review, the overwhelming majority of studies are not able to isolate the effects of alcohol warning labels from other initiatives.

As part of this review three issues should be considered. These are:

1. What theoretical frameworks support the introduction of warning labels?
2. Against what criteria should the effectiveness of warning labels be assessed?
3. Can the effectiveness of warning labels be isolated from other influences?

3.3 Theoretical frameworks and warning labels

Warnings and consumer advice on packaging are common on diverse products, from pharmaceuticals to swimming pool equipment. For example, following a 1999 report from the National Highway Safety Administration in the U.S. highlighting that sports utility vehicles rolled over in side-impact tests, the U.S. Safety Administration mandated that manufacturers replace the 15-year-old text only label warning with a coloured label that showed a vehicle tilted to one side (Associated Press 1999- cited in Argo and Main 2004).

As indicated above, and according to Cox, Wogalter, Stokes and Tipton Murff (1997) warning labels have been developed because of manufacturers' concerns for user safety, fear of litigation, legal requirements and to meet industry standards. Warnings typically include information on the safe use of a product, handling and disposal, dosage, contraindications and emergency procedures (Chapman and Carter 2003). Providing such information to consumers about goods and services sold in the market

place has been recognized as one of eight fundamental consumerist principles (Consumers International 2003). But what is the theoretical, and empirical, basis of support for warning labels?

One explanatory framework that has been directly applied to warning labels is the heuristic-systematic model (Chaiken 1980; 1987). This model proposes that two information processing modes may be responsible for explaining the relative effectiveness of warning labels (Zuckerman and Chaiken 1998). The first of these modes is systematic processing whereby an individual accesses, analyses and integrates information to reach a judgment. In contrast, heuristic processing involves the use of learned knowledge structures in the form of simple decision rules, to make judgements. According to Zuckerman and Chaiken (1998) “*systematic processing will only occur when an individual possesses adequate levels of both cognitive capacity and motivation*” (p.622). Two components that are likely to serve as heuristic cues are the colour of the warning text and the signal word that introduces the text. According to Zuckerman and Chaiken (1998), research indicates that a warning in red text is perceived as implying a greater hazard than black text and use of the word **Danger** implies a great hazard than the word **Caution** (e.g. Braun, Sansing, and Silver 1994; Wogalter, Magurno, Carter, Swindell, Vigilante and Daughtery 1995).

A bias effect can occur when the warning label information is ambiguous and therefore open to interpretation (Zuckerman and Chaiken 1998). In addition, bias may also occur when one part of the warning, for example a pictograph influences the interpretation of another part of the warning (Frantz, Miller and Lehto 1991) or when a person is experienced with a product (Robinson 1991).

In relation to motivation, when a message is congruent with existing beliefs, the warning will be judged as more valid and accurate than incongruent material (Zuckerman and Chaiken 1998). The degree of this congruence will influence the effective of the warning material. In addition, the higher the degree of perceived invulnerability the more defence-motivated systematic processing is likely to occur i.e. disregard for information contained in the warning message (Zuckerman and Chaiken 1998). Finally, Zuckerman and Chaiken (1998) also contended that the heuristic-systematic model may also account for the influence that social context may

have on compliance with product warnings (See Wogalter, Allison and McKenna 1989).

Social learning theory (Bandura 1986), the theory of reasoned action (Fishbein and Ajzen 1975), the Health Belief Model (Rosenstock 1974) and memory based models (Tolman 1932) have also been used to explain a number of health related behaviours. One element from these models that has been investigated, specifically in relation to alcohol warning labels, has been outcome expectancy. Stacy, Widaman and Marlatt (1990) have previously reported that general constructs of positive and negative expectancies toward alcohol use were empirically distinguishable from one another and from the construct of attitude towards drinking and those positive expectancies were a superior predictor compared to negative expectancies and attitudes of behaviour.

In follow up research, Stacy, MacKinnon and Pentz (1993) assessed the predictive strengths of different types of expectancy constructs in a sample of 12th grade high school students in the US in relation to the information included in warning labels on alcoholic beverages in the US. Stacy et al (1993) reported that negative expectancies were generally predictive of alcohol-related behaviour, especially driving under the influence (DUI). The authors concluded that this result implied that it was **possible** that expectancies about the negative outcomes targeted by the warning label influence alcohol-related behaviour. The research also highlighted the importance of social acceptance expectancies as an important predictor of drinking behaviour.

Later research by Cable and Sacker (2007) in the United Kingdom indicated that positive alcohol expectancies predicted all types of adolescent alcohol use in young men and women. Negative alcohol expectancies did not predict any type of drinking behaviour. Research by Leigh and Stacy (2004) demonstrating that negative expectancies only produced reduced consumption after 35 years of age, may help explain why negative expectancies to protect young people from heavy episodic drinking often fail. One implication of this research is that warning labels may be less effective with younger populations as they are primarily based on increasing negative expectancies (at least the ones used to date). Cable and Sacker also reported that norms were the most important predictor of adolescent alcohol use, supporting the

earlier U.S. research by Stacy et al (1993). This suggests that the impact of communication strategies, such as warning labels, will be influenced by the social context in which the labels appear – other strategies may be important to influence this context.

The Health Belief Model has been important in the development and assessment of health communication. Evidence from research testing the principles of the Health Belief Model (Rosenstock 1974) has concluded that providing information or increasing knowledge about the risk of a particular behaviour is insufficient to affect a person's actions. According to the Health Belief Model, to change behaviour an individual must feel personally susceptible to a particular health problem; must feel that the problem can cause them serious harm; know what actions can be taken to avoid the harm and finally understand the cost or benefits of the actions (Engs 1989). If the costs of changing behaviour outweigh the benefits then action is unlikely to occur (Engs 1989).

The concept of conveying personal susceptibility and harm is particularly difficult with young people (Vinal 1986). In relation to the effectiveness of alcohol and drug education with university students, Goodstadt (1984) concluded that while education increased knowledge, it resulted in minimal behaviour change. Similarly, after reviewing the effectiveness of over 100 alcohol and drug education programs across all school levels, Hanson (1982) reached a similar conclusion. In light of such research, Rees (1986) concluded that other complex social and cultural factors, in addition to knowledge and beliefs are important in changing any behaviour.

Warning labels, of course, represent one example of a communication strategy. As such, research on communication and health beliefs indicates that the relationship between such strategies and beliefs and health related behaviors' is not necessarily direct. In an examination of the role of mass media in influencing beliefs and behaviour related to skin cancer, Morton and Duck (2001) cited McGuire (1986) noting that despite substantial faith and investment in mass media, the available evidence regarding the role of media in influencing either beliefs or behaviour is equivocal. Part of the problem is, of course, that individuals are not passive recipients

of health information – a point discussed above in relation to other models and research. Many individuals appear to selectively attend to messages that are consistent with their beliefs and values. Morton and Duck noted that individuals are more likely to attribute risk, identified in health messages, to others and to interpret information in relation to themselves in a manner that is self-serving and optimistic. That is, we might downplay or ignore personal risk and be overly optimistic about our own health. Health messages, such as those that might be included in alcohol warning labels, may have more impact raising concerns about risk to others or the broad community as opposed to raising concerns about risks to oneself. Thus, “I’m okay – I’m at low risk of skin cancer. Those other people (who are not quite like me) are the ones who are at risk.”

As noted by Morton and Duck (2001):

“The theory holds that the effects of media will be most evident when media content provides individuals with unique information that is linked to personal goals ...” p.605.

However, these authors have also observed that there is considerable variation in results across studies, limiting the ability to determine the relevant variables that influence outcomes. Some researchers (e.g. Flay and Burton 1990) have noted that media can raise awareness about health risks but interpersonal communication is also required for messages to be perceived to have personal meaning or relevance and for behaviour change to occur.

Other evidence indicates that impersonal information may become more relevant if attention is given to content and style of message delivery and messages will have more impact if the individual can identify with the source of communication. Some have argued that such factors helped increase the influence of media campaigns about HIV (e.g. Basil and Brown 1997). This point could possibly be generalized to alcohol warning labels. Thus, alcohol warning labels might increase awareness of risk to others or the broad community, but strategies also need to be in place to make messages personally relevant, to encourage interpersonal communication about messages, to challenge norms that support high risk use, and to consider message content, source and style that will most likely increase personal relevance.

Morton and Duck (2001), in their study which examined the impact of media information about skin cancer, found some support for the above contentions. They reported that the influence of media messages about risk was influenced by the degree to which an individual relied on the media for information that was perceived as personally useful for goal satisfaction. Consistent with other work they also found that interpersonal communication played a role in the impact of exposure to messages and perceptions of risk to oneself and broader perceptions of risk. That is, they noted that discussion of risk with others increased personal perceptions of risk, while exposure to media (e.g. newspaper articles) increased perceptions of risk to others.

Such reports have relevance for alcohol warning labels. First, the relationship between warning labels and beliefs and behaviors' is not likely to be direct. Second, warning labels alone are unlikely to have significant impact. Third, influence of warning labels may vary among individuals. Individuals appear to differ to the extent to which they rely on media for information. Those who are more dependent on media for information may be more influenced by warning labels, whereas those who are more dependent on interpersonal communication may be less influenced by such media. Fourth, warning labels may increase knowledge of risk, but not necessarily change behaviour. Other complementary strategies may need to be adopted.

As noted, the research indicates that attention needs to be given to the style and content of health information, presumably including warning labels, along with the credibility of the source of information. This may also vary across individuals.

While there may not be strong evidence that health communication strategies, including warning labels, directly influence behavior, there is reason to believe that:

“...when delivered through channels that are perceived to be useful, they may become the starting point for further discussion of health issues, and, through this, increase the recognition of personal risk.” (Morton and Duck 2001, p.620).

In summary, the evidence about health risk communications through mass media is equivocal. While warning labels have not been directly considered in much of this research, similar processes, principles and conclusions probably apply. If we wish to affect perceptions of risk to others and the broad community, such strategies appear to have some influence. Beliefs about others may still have useful public health benefits:

“Beliefs about others may have little direct effect on individual health behavior. However, as part of the broader context in which health decisions are made, such beliefs may contribute to how audiences understand their own health and, through this, the relative importance attached to specific health issues and public health in general.” (Morton and Duck 2001, p.621).

If we wish to influence self-perception of risk, health communications may have greater impact if they are linked to other approaches that encourage discussion with other people, to facilitate positive interpersonal influences. Nevertheless, health communications may encourage changes in interactions around a particular (risk) behaviour that in turn may influence self-perception of risk. For example, recent research on alcohol warning labels by Tam and Greenfield (2008), that will be discussed later, lends some support to the possibility that warning messages may encourage a third party to attempt to intervene in another person’s attempt at drink driving.

3.4 Defining effectiveness

Regulatory agencies have often encouraged, and in some cases mandated, that warning labels be included on products on the basis that a well-informed consumer will more safely interact with or use a product (Hadden 1991; Wogalter and Laughery 1996; Heaps and Henley 1999). Given that such beliefs exist and the potential harm that could be caused should some warnings be ignored, it is important for public policy regulators to be aware of the effectiveness of warning labels. The majority of empirical research on the effectiveness of warning labels has focused on the types of information that will lead to consumers noticing or remembering information that has been included in labels and less frequently on the types of information that lead to behaviour modification (Heaps and Henley 1999).

In more recent reviews of the effectiveness of warning labels, Argo and Main (2004) and Hammond, Fong, Borland, Cummings, McNeill, and Driezen (2007) concluded that the effectiveness of warning labels can be measured in numerous ways, consistent with the processes postulated through models such as the Health Belief Model.

Using an information-processing framework (McGuire 1980; Wogalter and Sojourner 1999), Argo and Main (2004) developed the following criteria for assessing effectiveness:

1. Attention: Attention has been defined as the amount of cognitive effort and/or capacity that a person directs to a particular stimulus (Kahneman 1973). Warning labels need to cut through the visual information bombarding consumers (Lehto and Miller 1988, as cited in Argo and Main 2004) to attract attention.

2. Reading and comprehension: After a consumer notices a warning, it is important that they read and understand the content. According to Argo and Main (2004) consumer comprehension is a function of characteristics of the message: an opportunity to process the message: and characteristics of the message receiver.

3. Recall: Consumers must be able recall the potential risks conveyed in a warning and retrieve the information when necessary (McGuire 1980). According to Lehto and Miller (1988, as cited in Argo and Main 2004) limitations of memory and the context in which the information is presented will influence the likelihood that a consumer will store and retrieve warning messages.

4. Judgements: After a consumer has read and processed the information contained in a warning message, they form judgments of the products risks or hazards (Argo and Main 2004). According to Mowen, (1995, as cited in Argo and Main 2004) these judgements represent an estimate of the likelihood that an outcome will happen and how favourable or problematic this outcome will be to the consumer.

5. Behavioural compliance: According to Argo and Main (2004) warning labels have two major objectives. These are to prevent consumers from engaging in

behaviours that are unsafe and to promote appropriate behaviours when consumers use a product.

According to Argo and Main (2004) there are also several moderators that may influence warning label effectiveness. These moderators include:

- **Vividness-enhancing characteristics.** This variable relates to design features of a warning and may include font size, colour, spacing, level of specificity and symbols.
- **Warning location.** This refers to whether warning information is placed on or off the product.
- **Familiarity.** How familiar a consumer is with a product may also influence whether or not a consumer notices a warning label.
- **Age.** As cognitive abilities change with age (Law, Hawkins and Craik 1998), so too this may effect warning information recall.
- **Product type.** According to Argo and Main (2004) products fall under two categories: convenience goods and shopping goods. That is, goods that are frequently purchased with minimal comparative shopping and limited effort, those goods that are more expensive, less frequently purchased and involve more comparison shopping. This variable may also moderate warning label effectiveness.

After conducting a meta-analysis that included 44 articles (published between 1975 and 2001) investigating the impact of warning labels (alcohol, cigarettes, chemicals, pools etc) Argo and Main (2004) concluded that:

Attention: Warning labels moderately attract consumers attention (average $r=0.22$, $n=8,915$), the presence of vividness enhancing characteristics increased the likelihood that consumers noticed the warning ($r=0.38$, CI: 0.29 to 0.46; vs. $r=0.2$, CI: 0.18 to 0.23, in absence of vividness enhancing characteristics). Familiarity moderated attention ($r=0.15$, CI:0.12 to 0.19; vs $r=0.24$, CI:0.20 to 0.27 familiar vs not familiar with product). Product type did not produce any significant difference (convenience goods $r=0.21$, CI: 0.18 to 0.25; vs shopping goods $r=0.27$, CI: 0.19 to 0.35). Warning

location also had an impact on attention (on product placement $r=0.21$, CI: 0.18 to 0.24; vs off product (e.g. poster, signs and/or advertisements $r=0.35$, CI: 0.27 to 0.42). This result indicates that warnings are more effective in attracting consumers attention when they are on posters/signs and/or advertisements (rather than on the product).

Reading and comprehension: only nine articles were available on this domain but Argo and Main (2004) concluded that when consumers are presented with warning information, they are more likely to read and understand the information than when a warning label is not present (average $r=0.23$, $n=1,045$).

Recall: consumers can moderately recall information presented in a warning (average $r=0.32$, $n=1,538$). The presence of vividness-enhancing characteristics (font size, colour, spacing etc) did not affect recall (presence: $r=0.33$, CI: 0.24 to 0.42; absence: $r=0.28$, CI: 0.20 to 0.35), nor did familiarity moderate recall (familiar: $r=0.23$, CI: 0.13 to 0.33; not familiar $r=0.34$, CI: 0.25 to 0.43).

Judgements: there was a weak relationship between warnings and consumers' judgements of product hazards and risks (average $r=0.09$, $n=7,565$). This was further exacerbated for convenience goods (alcohol, tobacco, household cleaners) ($r=0.07$, CI: 0.03 to 0.11), indicating that consumers have higher perceptions of risk with shopping goods (more expensive, less frequently purchased) ($r=0.27$, CI: 0.21 to 0.32).

Behavioural compliance: warnings moderately influence behavioural compliance (average $r=0.19$, $n=3,877$). Counter to assumptions, consumers were more likely to comply when they were familiar versus not familiar with a product (familiar $r=0.39$, CI: 0.35 to 0.44 versus non-familiar $r=0.06$, CI: -0.03 to 0.15).

These results indicated that warnings influence attention, consumers are likely to read and understand warning information, and although warnings are unlikely to influence a consumer's perception of risk, they can influence behaviour (Argo and Main 2004).

3.5 Isolating the impact of warning labels.

While historically and politically, behavioural change has represented the ultimate litmus test of warning label effectiveness, Argo and Main (2004) argued that other dimensions are of equal importance, depending on the aim of the warning label. They concluded that:

“Some warnings are designed to convey information about a product’s potential risks, and as long as consumers understand the risk involved, the choice of behaviour is ultimately up to them. In addition, if consumers accurately recall the dangers associated with the consumption of a particular product but choose to ignore them, the warning label has still effectively served its purpose.” (Argo and Main 2004, p.205).

Finally, while measures of salience have been shown to be predictive of behaviour change, each outcome or domain will also be mediated by a range of other individual (e.g. socio-economic status) and environmental (other sources of health information and product promotion and marketing strategies) factors (Edwards et al 1994). Subsequently, being able to isolate the single impact of one measure such as the presence of a warning label is as difficult as *“unravelling gossamer with boxing gloves”* (Chapman 1993, p.429).

In summary, warning labels that inform consumers of product risk have become increasingly commonplace and now appear on products as diverse as motor vehicles to sun tanning beds. The available theory suggests that health communication strategies may be more likely to inform (although they need to be personally relevant) than influence behaviour. Changing behaviour may require additional strategies, such as attention to interpersonal context, and assisting individuals to access relevant strategies to change when indicated. The available evidence does suggest that consumers notice and are likely to read and understand warning information. Where the evidence is more equivocal is in relation to changing consumer’s perception of risk, and influencing behaviour (Argo and Main 2004). On the other hand, increasing understanding of risk is, some argue, a legitimate goal.

In conclusion, it may be that warning labels can represent a useful public health strategy, when consistent with practices that have been described as influencing effectiveness. However, they are more likely to influence behaviour when included as one part of a comprehensive approach.

Chapter 4: Heavy episodic drinking

For many developed countries, including Australia and New Zealand, alcohol consumption is one of the most common causes of preventable injury, disability and premature death. Alcohol related problems are not, as is sometimes assumed, restricted to a small minority of people who are heavy drinkers: a large proportion of alcohol related problems is attributable to the short-term, or acute, effects of alcohol use among a significant proportion of the population who drink at risky levels, at least occasionally. For example, in New Zealand, in a 12 month period, almost 15% of the adult population consumed large amounts of alcohol at least once a week (for males this was defined as more than six standard drinks on one drinking occasion; for females this was defined as more than four standard drinks on one drinking occasion). Some 9.5% of respondents indicated that they had consumed enough alcohol to feel drunk at least once a week (Ministry of Health 2007). Similar findings have been reported in Australia. Using 2001 Australian self-reported data on alcohol use, which accounted for less than half of all alcohol known to have been consumed (i.e. indicating that the estimates may well be underestimates) Chikritzhs and colleagues (2003) concluded that:

- 62% of alcohol was consumed at levels that posed risk in the short-term; and
- 24% of males and 17% of females were at risk of harm in the short-term at least once a month.

Evidence that is more recent is consistent with these findings. In 2007, 7.8% of Australians aged 14 years or older drank in a pattern that was considered risky or high-risk for harm in the short term, at least once a week. A further 12.6% drank at risky or high-risk levels for harm in the short term at least once a month and a final 14.2% did so once or more a year (Australian Institute of Health and Welfare 2008b).

Some of the harms associated with the acute effects of alcohol consumption, are illustrated in the following summary:

- In 2000, there were an estimated 1,040 alcohol attributable deaths in New Zealand. This represented 3.9% of all registered deaths for that year. In

addition, Connor and colleagues estimated that some 17,200 years of life were lost because of alcohol consumption. It was noted that injury was one of the biggest contributors to this burden, which was highest among young people (Connor, Broad, Rehm, Vander Hoorn and Jackson 2005);

- Similarly, in Australia:
 - In 1998/99, an estimated 8,661 Australians were hospitalised as a result of injuries sustained in alcohol-related assaults (a rate of 4.6 per 100,000 persons (Matthews, Chikritzhs, Catalano, Stockwell and Donath 2002);
 - In a single year (1997) there were 124 deaths, 4,381 years of life lost and 26,882 hospital bed days due to alcohol attributable violence (Chikritzhs, Stockwell, Heale, Dietze and Webb 2000);
 - Between 1993/94 and 2000/01 over half a million Australians were hospitalised due to risky/high-risk drinking (Chikritzhs et al 2003);
- Alcohol is responsible for approximately 27%-30% of road traffic accidents in New Zealand. Alcohol was also estimated to be responsible for up to 48% of cases of injury or death due to violence, depending on age, sex and ethnicity (for example, see Connor et al 2004; 2005). The evidence indicates that approximately 40% of road traffic accidents in the Maori population and 24% of road traffic accidents in the non-Maori population could be prevented. Although Maori people were less likely to drink than non-Maori people, those who drank were significantly more likely to drink large amounts of alcohol (50.3% vs. 23.3%) (Ministry of Health 2007);
- Where available, statistics show that Indigenous Australians are at least twice as likely to die from risky and high-risk consumption of alcohol as their non-Indigenous counterparts. While some of these deaths are from chronic heavy use, a significant proportion arises from the acute effects of alcohol (Chikritzhs et al 1999; 2000; Chikritzhs and Pascal 2004; 2005);
- Other people's drinking has impact on bystanders. For example, 5.7% (5.1–6.3) of New Zealanders aged 12–65 reported being the victim of physical assault by someone who had been drinking, 5.3% had been sexually harassed by someone who had been drinking and 1.7% had suffered a motor vehicle

accident because of someone else's drinking (Connor et al, 2004; Ministry of Health 2007); and,

- Some research studies indicate that in Australia, as much as 60% of all police attendances and 90% of all late night calls involve alcohol (Doherty and Roche 2003). In the 12 months prior to June 2000, NSW police identified almost 14,000 assault incidents (23% of all such incidents) and over 5,000 offensive behaviour incidents (58% of all such incidents) as alcohol-related (Briscoe and Donnelly 2001).

4.1 Alcohol consumption amongst young people

Alcohol problems are manifest across all age groups. However, younger people (i.e. under 30 years) have comparatively high proportions of risky drinkers, particularly those who drink in a manner that increases the risk of short-term harms. It is important however to note that there is no strong body of evidence to guide recommendations about low-risk drinking levels for young people and conversely to determine high risk levels. Young people are generally smaller than adults, and there is emerging evidence about the impact of alcohol on the developing brain – thus young people may be more susceptible to at least some adverse outcomes of drinking. There is an increasing recognition that determinations of low risk drinking for young people should probably be more conservative than for adults. It is also important to note that some studies have found that early onset heavy drinking is associated with a range of later problems, including higher risk of mental health problems, heavy drinking, other drug use and criminal involvement. Other studies have not found such an association (see Loxley et al, 2004 for a summary). Data about alcohol related harm among young people should be interpreted in this context.

There are two major sources of Australian data about drinking among young people:

1. The National Drug Strategy Household Survey (NDSHS); and
2. The Australian School Survey on Alcohol and Drugs (ASSAD).

Similar reports are published in New Zealand, including:

1. Alcohol use in New Zealand: Analysis of the 2004 New Zealand Health Behaviours Survey – Alcohol use.

The National Alcohol Indicators Project (NAIP), coordinated through the National Drug Research Institute at Curtin University also produces regular bulletins and reports, based on multiple Australian data sources that describe alcohol consumption and related problems, and some of these have focussed on young people. In New Zealand, groups such as the Alcohol Advisory Council of New Zealand (ALAC) and independent researchers, conduct similar analyses and syntheses of data. The following summarises some of the available evidence. In Australia:

- Fourteen point three per cent of Australians over 14 years reported that in the previous 12 months they had driven a motor vehicle under the influence of alcohol and almost 5% reported they had gone to work under the influence; and,
- Of young drinkers (aged 14-19) who drank in the past 12 months, 32.1% had reported a loss of memory at least once in the past 12 months.

Based on 2007 data:

- Males commence drinking at an earlier age than females; for example, the average age at which males first drank a full glass of alcohol was 16.3 years, whereas for females it was 17.1 years (Australian Institute of Health and Welfare 2008a);
- Frequency of drinking and daily drinking tends to increase with increasing age. For example;
 - Approximately one in 500 (0.2%) of young people aged 12–15 years of age reported *daily* drinking while approximately one in every 125 (0.8%) 16–17-year-olds reported *daily* drinking;
 - Approximately 28% of 12–15-year-olds reported drinking less than weekly, a result consistent across males and females. By age 18-19, 89% of 18–19-year-olds reported drinking daily, weekly or less-than-weekly, compared with 75.6% of 16–17-year-olds and 30.1% of 12–15-year-olds (Australian Institute of Health and Welfare 2008b); and,

- Almost 24% of males and just over 27% of females aged 16-17 drank alcohol at levels that risked short term harm at least once a month in the previous 12 months. Among 18-19 year olds, 43.7% of males and 46% of females drank at risky or high risk levels at least once a month. Just over 17% of males and females drank in a risky or high risk manner at least once a week.

The Australian Secondary School Alcohol and Drug (ASSAD) surveys (White and Hayman 2006) indicated that:

- A significant proportion of young people drink at risky levels. The proportion of students who consumed alcohol at a *risky level on at least one occasion in the past week* increased from less than half a percent of 12 year olds, to 2% among 13-year-olds, and to 21% among 17-year-olds; and,
- There were three main places for students to drink: the family home, a friend's home or a party:
 - About 75% of school children who were current drinkers indicated that they drank their last alcoholic drink in one of these three places;
 - Five per cent of current drinkers reported drinking at a public space such as a beach or park, and generally less than 3% of students reported drinking alcohol in other places;
 - The proportion of children drinking at home decreased with age among both young males and females, from around 50% of 12-year-olds to 23% of 17-year-olds. In contrast, the proportion of school children drinking at a party increased with age from 17% of 12-year-olds to about 36% of students 15 years and over.

The most recent NAIP analyses on young people's drinking (Chikritzhs and Pascal 2004; Chikritzhs, Pascal and Jones 2004) indicated that:

- Between 1993 and 2002, an estimated 2,643 young Australians aged 15–24 years died from injury or disease caused by risky and high risk drinking;
- Over the nine years between 1993/94 and 2000/01, more than 100,000 young Australians were hospitalised for conditions attributable to risky and high-risk

alcohol consumption. Moreover, after a nation-wide decline in alcohol-attributable death rates during the 1990s, several jurisdictions appeared to show increased numbers of alcohol-attributable deaths in the last few years;

- Road injuries, suicide, assault and drowning accounted for over 90% of all alcohol-attributable deaths in young people. Alcohol-related falls, alcohol abuse and alcohol dependence were also among the reasons for hospitalisations among young people;
- Indigenous youth were more than twice as likely as non-Indigenous youth to die from alcohol-attributable injury and disease and trends in death rates for young Indigenous people remained stable between 1990 and 2002, despite a steady decline in alcohol-attributable death rates for their non-Indigenous counterparts;
- Between 1993 and 2002, an estimated 501 Australians aged 14-17 years died from alcohol-attributable injury and disease caused by risky/high risk drinking; this equates to one teenage death a week. More than 3,300 teenagers were also hospitalised in one single year (1999/2000) (Chikritzhs, Pascal and Jones 2004);
- Teenagers living in rural areas have higher rates of alcohol-attributable death than their metropolitan counterparts and young people living in regional and rural areas were 70% more likely to die from risky drinking than those living in cities;
- Teenage males were three and a half times more likely than females to die from alcohol-attributable injury;
- Among 14-17 year-olds, non-pedestrian road injury and suicide are the most common causes of death, while falls and assault injuries the most common causes of hospitalisations in males, and 'alcohol abuse' the most common in females;
- Nationally, numbers of alcohol-attributable deaths for 14–17 year olds have declined steadily since 1990; and,
- Young males were three to four times more likely than young females to die from alcohol-attributable causes (Chikritzhs and Pascal 2004; Chikritzhs et al 2004).

Similar findings exist in New Zealand. The following summarises various reports on drinking and related consequences in New Zealand (ALAC 2005; Ministry of Health 2007):

- Almost 56% of New Zealanders aged 12-17 had consumed alcohol in the previous 12 months and of those some 4.2% had drunk alcohol on average seven or more times a week;
- Some 12.4% of those aged 12-17 drank large amounts (more than 6 standard drinks for males and four standard drinks for females) of alcohol at least once a week in the previous 12 months. Maori people (23.8%) were more likely to drink large amounts than non-Maori people (9.8%);
- Correspondingly, 12.2% of young drinkers had consumed enough alcohol to feel drunk at least once per week in the previous 12 months;
- On the other hand, those aged 12-17 are less likely to have consumed alcohol in the previous 12 months – those most likely to have consumed alcohol were in the age range of 18-54 years;
- Thirty-three point seven per cent of those aged 18-24 and 30.1% of those aged 25-34 drank more than four times a week. Fifteen point four per cent and 12.2% respectively had drunk 7 or more times a week;
- Approximately two in five drinkers aged 12-17 years drank large amounts of alcohol on a typical drinking occasion, rising to one in two of 18-24 year olds. Those aged 18-24 years old were most likely to drink large amounts at least once per week (34.2%). Correspondingly, 37.5% of males and 16.1% of females aged 18-24 years drank enough alcohol to feel drunk, at least once per week;
- The New Zealand alcohol-attributable fractions for a number of conditions have been estimated among 15-29 year olds. Examples of acute adverse outcomes for, first Maori and second non-Maori males, include:
 - Road traffic injuries - 60.4% and 40.3%;
 - Falls – 39.4% and 26.3%;
 - Drowning – 46.5% and 31%;
 - Unintentional injury – 51.9% and 34.6%;
 - Violence – 48.3% and 32.2%.

Those in the 15 to 29 year age group had the highest mortality attributable to alcohol (212); and,

- A greater proportion of the 18 to 24 age groups in New Zealand put themselves (and others) at risk by driving under the influence of alcohol.

In a recent New Zealand study of undergraduate students (Kypri, Paschall, Langley, Baxter, Cashell-Smith and Bourdeau 2009) it was reported that, of the 81% of women and men who reported drinking in the previous 4 weeks, 37 % reported one or more 'binge episodes in the last week'. In addition, 14% of women and 15% of men reported two or more 'binge episodes in the last week', and 68% were identified as hazardous drinkers (scoring four or more on the consumption subscale of the AUDIT (an alcohol problems screening instrument - Saunders, Aasland, Babor, de la Feunte and Grant 1993). Adverse outcomes for hazardous drinkers included blackouts (33 %), unprotected sex (6%) drink driving (9% of women and 11% of men) and being physically aggressive towards another person (5%) (Kypri et al 2009).

Young people can also experience the negative consequences of other people's drinking. The 2007 Australian NDSHS has indicated that in the previous 12 months some 27.9% of 14-19 year olds had been verbally abused by someone who had been drinking (39.9% of 20-29 year olds) and 6.9% of 14-19 year olds and 10.4% of 20-29 year olds had been physically abused by someone under the influence of alcohol (Australian Institute of Health and Welfare 2008b) Similarly, ALAC (2005) reported that, in the previous 12 months, 5.7% of New Zealanders aged 12-65 had been assaulted by someone who had been drinking while 1.7% had been involved in a motor vehicle accident that involved someone else's drinking. Those in the 18-24 age group were most likely to have adverse outcomes as a consequence of another's drinking: for example, 16.6% had been assaulted by someone who had been drinking – more than twice the rate of any other age group – rising to approximately one in five of all males aged 18-24. Maori people were more likely to have been assaulted than non-Maori people. Females aged 18-24 were most likely to have been sexually harassed by someone who had been drinking (20.6% of 18-24 year old females). Rates were again higher for Maori females.

In short, a significant proportion of young people are affected by their own or another's drinking. Many of these consequences relate to the short-term, or acute consequences of drinking alcohol.

4.2 Awareness of the health risks associated with alcohol

A range of factors which influence risky alcohol use among young people have been identified (e.g. see Loxley et al 2004). These include:

- Access to alcohol via price, hours of sale, controls on age of access and level of enforcement of liquor licensing laws;
- Perceived and actual levels of alcohol use among peers and the broader community;
- Perceptions of risk and benefits of alcohol use;
- Attachment to families/adults and engagement in activities with adults; and
- Parenting factors, including;
 - Favourable parental attitudes to drinking;
 - Parental neglect and abuse;
 - Parental problems with alcohol;
 - The degree of parental harmony and parent-adolescent conflict;
 - Parenting skills, such as communication skills, capacity to resolve conflict, and involvement in monitoring children's behaviour.

Clearly many of these are outside of the influence of strategies such as alcohol warning labels. However, perceptions of risk and benefit are likely to be particular targets of strategies that aim to communicate health information.

Various models have been used to explore perceptions of risk associated with alcohol use, especially among young people. These have included models of 'problem

behaviour syndromes' (e.g. Jessor and Jessor 1977), models that include personal characteristics such as sensation seeking or impulsivity (e.g. Zuckerman 1984) and models of reasoned action (e.g. Fishbein and Ajzen 1975). Some have argued that risk taking is not a deviant behaviour but is developmentally adaptive (e.g. Chassin et al 1989; Shedler and Block 1990). Slovic (1992) proposed that the degree to which a risk is known or understood and the degree to which it evokes discomfort or 'dread' were keys to risk perception and its influence on behaviour.

Other research also indicates that the perceived benefits of risk taking behaviours, such as risky alcohol consumption (e.g. direct drug effects; symbolic benefits; peer approval), may have more influence on behaviour than risks that are perceived as unlikely and/or distal (e.g. see Parsons et al 1997). The perception of benefits associated with drinking may be influenced by outcome expectancies that are drawn from personal experience, peer influence and cultural expectations, and sometimes these expectancies have greater influence than objective evidence. For example, some people may believe that alcohol increases sexual performance or reduces anxiety, despite evidence that suggests that the opposite is often the case. Simply put, much of the theory and evidence suggests that while we may be successful in raising perceptions of risk through a variety of strategies (e.g. see Hampson et al. 2001) individuals' perceptions of the balance of risks and benefits can influence the decision that the risk is worth the expected benefits. As reported by Parsons et al. (1997), perceived personal benefits may have more influence on behaviour than perceived risks. Thus, strategies to reduce risk taking may need to combine awareness raising (e.g. warning labels) with strategies to challenge perceived benefits of risky consumption and approaches that enhance access to alternative behaviours that confer attractive benefits. This is consistent with arguments that approaches, such as health communication, need to be combined with other strategies.

Having briefly explored models of risk perception, we now turn to evidence regarding awareness of alcohol health risks. As indicated in the brief summary in the previous section, much alcohol related harm arises from the acute or short-term effects of consumption. Acute harms associated with intoxication (road trauma; violence; intentional and unintentional injury) constitute the bulk of serious problems arising from younger people's drinking, in this context, in New Zealand and Australia, a

current focus of emerging alcohol policy is on heavy episodic drinking among this population.

Increasingly, communities are also becoming concerned at the “collateral impact” of alcohol consumption. That is, alcohol intoxication can have impact not only on the individual drinker, but also on his or her close associates (e.g. family, friends, colleagues) and the broader community through, for example, decreased community safety, greater use of emergency and other hospital services, reduced productivity and diversion of policing resources. Some of these concerns are also illustrated above. Two research groups, in New Zealand (headed by Sally Casswell) and Australia (headed by Robin Room) are independently examining these costs in more detail.

To provide Australians with knowledge that would contribute to the ability to enjoy alcohol while minimising harmful consequences, the National Health and Medical Research Council (NHMRC) developed the *Australian Alcohol Guidelines: Health Risks and Benefits* with recommendations for low-risk drinking (National Health and Medical Research Council 2001). The NHMRC use the term standard drink when making recommendations about drinking limits. In Australia, one standard drink refers to a beverage containing 10 grams (equivalent to 12.5 millilitres) of alcohol (National Health and Medical Research Council 2001). The Australian Alcohol Guidelines contain twelve specific guidelines targeting different subsections of the population. According to the NHMRC’s Australian Alcohol Guideline 1 (for the whole population), to minimise risks in the short and long-term, and gain any longer-term benefits from alcohol, males should consume: i) an average of no more than four standard drinks a day; ii) no more than 28 standard drinks over a week; iii) not more than six standard drinks in any one day; and iv) have one or two alcohol-free days per week.

According to the NHMRC (2001) alcohol guidelines women should: i) consume an average of no more than two standard drinks a day; ii) no more than 14 standard drinks over a week; iii) not more than four standard drinks in any one day; and iv) have one or two alcohol-free days per week.

According to Guideline 9 which applies to **Young adults (aged about 18–25 years)**. **Young adults are** urged not to drink beyond the levels set in Guideline 1; should not drink at all for at least several hours before undertaking potentially risky activities; and should not mix alcohol with other mood altering drugs. Guideline 10 which applies to **Young people (up to about 18 years)** recommends that young people should follow the recommendations under Guideline 9; **AND** if they choose not to drink, should be supported in this decision; in settings where alcohol is available to them, should be supervised by adults at all times; should keep any drinking to a minimum; most importantly, should not drink to become intoxicated; to become responsible adult drinkers, a gradual, supervised introduction to alcohol is recommended (NHMRC 2001). New Guidelines have just been released in Australia (NHMRC 2009). The four Guidelines are as follows:

Guideline 1

Reducing the risk of alcohol-related harm over a lifetime

The lifetime risk of harm from drinking alcohol increases with the amount consumed. For healthy men and women, drinking no more than two standard drinks on any day reduces the lifetime risk of harm from alcohol-related disease or injury.

Guideline 2

Reducing the risk of injury on a single occasion of drinking

On a single occasion of drinking, the risk of alcohol-related injury increases with the amount consumed. For healthy men and women, drinking no more than four standard drinks on a single occasion reduces the risk of alcohol-related injury arising from that occasion. Each drinking occasion also contributes to the lifetime risk of alcohol-related harm.

Guideline 3

Children and young people under 18 years of age

For children and young people under 18 years of age, not drinking alcohol is the safest option.

Parents and carers should be advised that children under 15 years of age are at the greatest risk of harm from drinking and that for this age group, not drinking alcohol is especially important. For young people aged 15–17 years, the safest option is to delay the initiation of drinking for as long as possible.

Guideline 4

Pregnancy and breastfeeding

Maternal alcohol consumption can harm the developing fetus or breastfeeding baby. For women who are pregnant or planning a pregnancy, not drinking is the safest option. For women who are breastfeeding, not drinking is the safest option.

The New Zealand Ministry of Health Food and Nutrition Guidelines Statements for Healthy Adults include the recommendation: “If choosing to drink alcohol, limit your intake”. The Alcohol Advisory Council of New Zealand also provide a set of guidelines for low risk drinking and recommend that men should consume no more than 21 standard drinks (equivalent to 10 grams of alcohol) in any one week and no more than six standard drinks on any one drinking occasion. For women, these levels are no more than 14 standard drinks per week and no more than four standard drinks on any one drinking occasion (ALAC, 2008). In addition, the Alcohol Advisory Council advises that there is no level of drinking that is safe for all people all the time. They recommend that certain groups of people should drink less than these guideline amounts. These groups include:

- Thin people;
- Young people;
- Older people;
- People with a strong family history of alcoholism;
- People who are or who have been dependent on other drugs; and,
- People who have a poor diet, or are under-nourished.

Women who are pregnant are advised that it is preferable not to drink any alcohol at all (ALAC, 2008).

In the most recent NDSHS (calculated on the basis of the 2001 Guidelines) of males aged 14 years or older who drank at low-risk levels for harm in the short term, 30.2% indicated that they thought that an adult male could drink seven or more standard drinks in a 6-hour period without putting his health at risk. By contrast, 23.0% of males who drank at risky or high-risk levels for short-term harm themselves thought that an adult male could drink seven or more standard drinks without putting his health at risk. 7.9% of males aged 14 years or older who drank at low-risk levels for

harm in the long term, thought that an adult male could drink five or more standard drinks every day for many years without putting his health at risk. 30.5% of males who drank at risky or high-risk levels for long-term harm themselves, thought that an adult male could drink five or more standard drinks every day for many years without putting his health at risk (Australian Institute of Health and Welfare 2008b).

In comparison, 76.2 % of females aged 14 years or older who drank at low-risk levels for harm in the short term, thought that an adult female could drink five or more standard drinks in a 6-hour period without putting her health at risk. Of females who drank at risky or high-risk levels for short-term harm 59.2% thought that an adult female could drink five or more standard drinks without putting her health at risk.

Of females aged 14 years or older who drank at low-risk levels for harm in the long term, 9.7% thought that an adult female could drink three or more standard drinks every day for many years without putting her health at risk. Of females who drank at risky or high-risk levels for long-term harm, 21.5% thought that an adult female could drink three or more standard drinks every day for many years without putting her health at risk. According to the Australian Institute of Health and Welfare (2008b), although no data were available to investigate perceptions by different age groups, other data from the 2007 NDSHS indicated that amongst 14-19 year olds 55% of males and 47.9% of females approved the regular use of alcohol and amongst 20-29 year olds 60.6% of males and 50.7% of females approved of the regular use of alcohol by an adult.

Based upon data from the 2005 ASSAD survey in Australia, from the age of 14, 23% of respondents saw themselves as an occasional drinker and only 6% of males and 5% of females saw themselves as a light drinker. According to White and Hayman (2006), use of the term 'party drinker' did not differ for males and females and increased with age for each gender, from around 6% of 13-year-olds to 41% of males and 40% of females aged 17. A negligible number of students thought they were heavy drinkers (White and Hayman 2006). No information was collected in the survey of perception or knowledge of alcohol or associated risk.

In the recent report by Clark, Robinson, Crengle, Herd, Grant and Denny (2008) on the results from the Youth'07 survey of Maori secondary school students in New Zealand, 84.4% reported that they had ever tried drinking alcohol. Over a quarter (26.4%) of the sample who drank alcohol reported they had drunk alcohol two or three times in the last 4 weeks; 23.3% had drunk alcohol once a week; 12.8% reported drinking several times a week or more often and 50.9% reported binge drinking (defined as drinking 5 or more standard drinks with 4 hours). Unfortunately, no information was included in the report on young peoples' perception or knowledge of alcohol or any associated risks.

Based upon research from New Zealand (Bennet and Coggan 2000; Bellamy 2005), a common perception amongst young people is that drinking is normal and that "binge drinking" is an inevitable part of adolescent development. As a consequence, it was commonly perceived that some degree of risk was also inevitable and hence acceptable. According to Read, Wood, Davidoff, McLacken and Campbell, (2002, as cited in Roche, Bywood, Borlagdan, Lunnay, Freeman, Lawton, Tovell and Nicholas 2007) an influential factor in adolescent drinking is the perception of what constitutes "normal" drinking amongst a peer group. Unfortunately, adolescents commonly overestimate the amounts that their peers drink and subsequently drink in a risky manner reflective of what they perceive as the norm (Lewis and Neighbours 1994, as cited in Roche et al 2007).

According to Roche et al (2007) a social norms campaign (Social Norms Analysis Project) which aims to reduce alcohol related harm among high school students, through investigating the way that young people are influenced by their perceptions of what they think their peers are doing is being trialled in Australia. As social norms and the drinking of peers is so influential in predicting young peoples drinking (Roche et al 2007) such research is of strategic importance for the development of future initiatives and highlights the importance of the recent research by Tam and Greenfield (2008) on the influence of alcohol warning labels on third parties (see below).

Chapter 5: International overview of alcohol warning labels

As already discussed in an earlier section, there has been significant investment in strategies to prevent and reduce alcohol related problems, including those that target problems that arise in the short term. There is a body of evidence about what is effective, what holds promise and what is of doubtful value (e.g. Babor et al 2003; Caswell and Maxwell 2005; Kypri et al 2005; Loxley et al 2004). Information and persuasion strategies fall into the category where there is less conclusive evidence, whether delivered through a public health strategy (e.g. information campaigns; school drug education) or through an alcohol industry marketing strategy (e.g. the influence of alcohol advertising). It is important to note, however, that in a developing body of knowledge, absence of evidence is not always indicative of “no effect.” Methodological limitations have relevance to interpreting data. For example, econometric analyses of the effects of alcohol advertising, where consumer behaviour is aggregated, may not be the best assessment of the impact on segments of the population: advertising may have limited impact on saturated markets (e.g. middle-aged drinkers who have long established drinking preferences and behaviours) compared to less saturated and/or naive markets (e.g. younger people). Thus, using aggregated data may not be an appropriate method to assess the impact of such persuasion strategies. It is relevant to keep this point in mind when considering the evidence about alcohol warning labels.

5.1 History of warning labels

The United States was the first country to introduce health warnings on tobacco products in 1966 (Chapman and Carter 2003). Australia subsequently introduced warning labels on tobacco products in 1973 and New Zealand in 1974. Based on the extensive research investigating the efficacy of tobacco warnings Scollo and Winstanley (2008) have concluded that health warnings on tobacco packaging have been a highly cost-effective way:

- To inform consumers about the toxic constituents of tobacco smoke and the health effects of smoking; and

- To provide details of where to go for advice on quitting.

Similarly, it has been argued that alcohol warning labels allow consumers to make informed choices about what they drink and warn them of the potential dangers and health risks from the product (Wilkinson and Room 2008a; International Center for Alcohol Policies 2007). In providing such information, warning labels also deliver a clear message to consumers that alcohol is not an ordinary commodity (Deutsche Hauptstelle für Suchtfragen e.V. (DHS) 2008).

Although alcohol health warnings are mandated in a number of countries (e.g. Argentina, Armenia, Benin, Brazil, Cape Verde, Colombia, Costa Rica, Ecuador, Guatemala, Honduras, Iceland, India (State of Assam), Indonesia, Mexico, Mongolia, Portugal, South Korea, Spain, Taiwan, Thailand, United States, Uruguay, Venezuela and Zimbabwe) (Stockwell 2006) there remains limited research that has specifically investigated their effectiveness. Conversely, research investigating the effectiveness of tobacco warning labels is extensive. Such research provides a useful context for analysing the available research that has examined the efficacy of alcohol warning labels.

5.2 An international overview of the history of alcohol warning labels

According to a report published by Stockwell in 2006, the following countries have all introduced mandatory alcohol warning labels: Argentina, Armenia, Brazil, Colombia, Costa Rica, Ecuador, Guatemala, Honduras, Iceland, India (State of Assam), Mexico, Portugal, South Korea, Taiwan, Thailand, United States, Venezuela and Zimbabwe. Other countries such as Japan, have introduced voluntary labeling, where local brewers include messages warning about drinking during pregnancy and in Canada, since 1992, the Yukon and the Northwest Territories have required liquor stores to provide warning labels on all bottles of wine and spirits as well as on packaged beer (Stockwell, 2006). In addition, the International Center for Alcohol Policies (2007) reported that Benin, Cape Verde, Indonesia, Mongolia, Spain, and Uruguay have also now implemented health warning labels on alcohol containers.

In a later report by Anderson, for the German Centre for Addiction Issues (Deutsche Hauptstelle für Suchtfragen e.V (DHS) 2008), it was noted that:

- Since October 2006, France had made it mandatory to include health warnings on alcohol about the risks of consumption during pregnancy;
- Germany has mandated for labeling to appear on “alcopops”;
- The UK has included as part of a voluntary code the message “drink responsibly” and the web address for *drinkaware* on all alcoholic beverages; and,
- Denmark has instigated voluntary labeling.

Information from the Medical Research Council in Cape Town, also confirms that warning labels have recently been implemented in South Africa (personal communication)

Based upon unconfirmed information:

- Sweden displays one of the following messages on alcohol containers: “Under 18? Avoid alcohol”, “Pregnant? Avoid alcohol”, “Driving? Avoid alcohol” and “At work? Avoid Alcohol” (source: <http://www.thelocal.se/7833/20070709/>)
- In El Salvador the following message appears on alcohol containers : “Excessive consumption of this product is harmful to health, it is prohibited to be sold to people under 18” (Source: http://www.who.int/substance_abuse/publications/en/Alcohol%20Policy%20Report.pdf)

For examples of labels from the U.S., France and South Africa, see Figures 4 to 15. The figures from the U.S. highlight the variation that exists in relation to the placement of and background and font colours used for displaying the warnings. See Table 1 for examples of the different wording on alcohol warning labels that were included in the report by Stockwell (2006).

5.3 Examples of warning labels



Figure 4. Health warning label from a bottle of ale imported from Belgium - U.S.



Figure 5. Health warning label from an Alcoholic beverage produced in Spain and imported to the U.S.

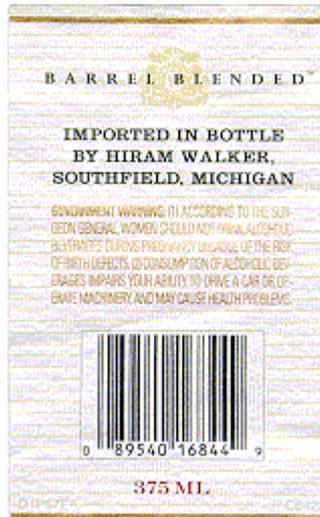


Figure 6. Health warning label on a bottle of Canadian Club Whiskey imported from Canada to U.S.



Figure 7. Health warning label on a bottle of Merlot produced in France – imported to U.S.



Figure 8. Health warning label on a Bacardi Breezer bottle – U.S.

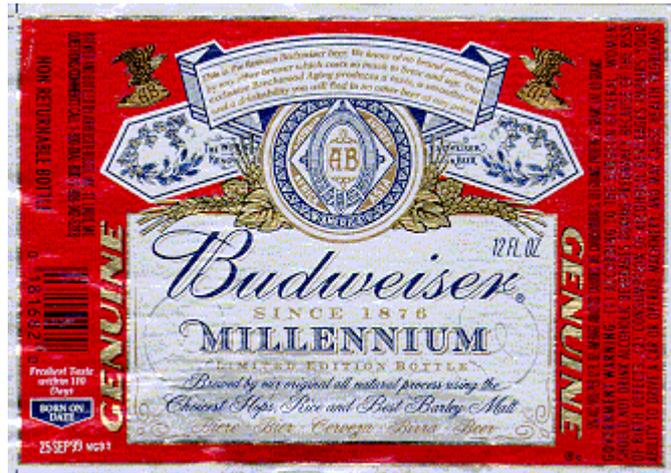


Figure 9. Health warning label on a Budweiser bottle – U.S.



Figure 10. Health warning label on a Miller Lite beer bottle – U.S.

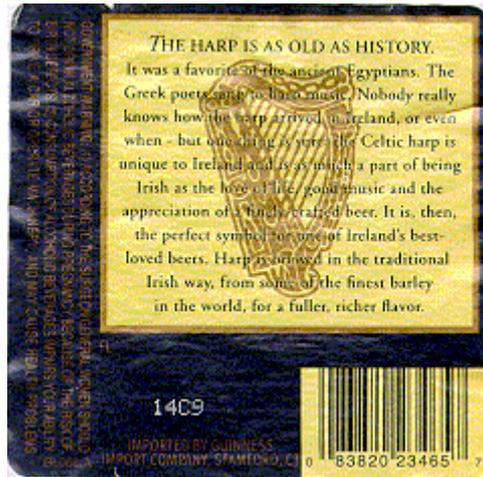


Figure 11. Health warning label on a Harp Lager bottle imported from Ireland – U.S.

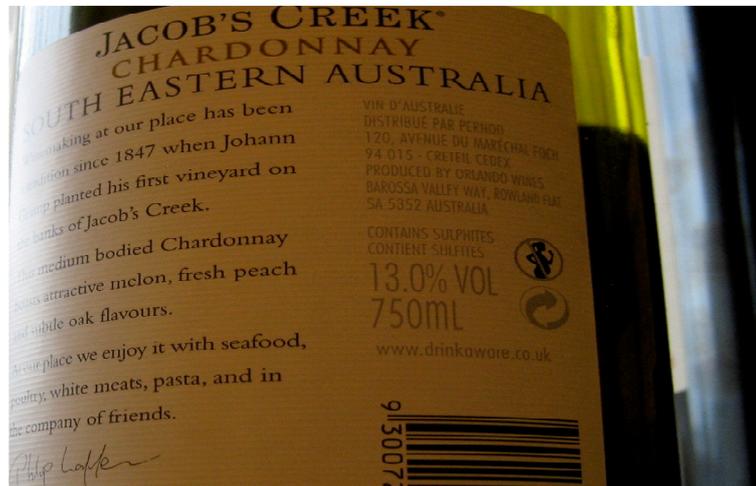


Figure 12: Health warning on bottle of Jacobs Creek Chardonnay depicting risks of drinking during pregnancy (France)



Figure 13: Bottles from France showing pregnancy warning labels



Figure 14: Bottles from South Africa depicting warnings about alcohol and health and drink driving



Figure 15: Bottle from South Africa depicting warning about pregnancy

Table 1 Text of alcohol warning labels from other countries

Country	Text of warning	
	General warnings	Pregnancy related warnings
Argentina	“Drink with Moderation” and “Prohibited for people under 18 years old”	
Brazil	“Avoid the risks of excessive alcohol consumption”	
Colombia	“The excessive use of alcohol is harmful to your health” “Prohibited for sale to minors”	“This product is harmful to the health of children and pregnant women”
Costa Rica	“Drinking liquor is harmful to health” or “The abuse of liquor is harmful to health”	
Ecuador	“Warning. The excessive consumption of alcohol restricts your capacity to drive and operate machinery, may cause damage to your health, and adversely affects	

	your family. Ministry of Public Health of Ecuador. Sale prohibited to minors under 18 years of age”	
France		<p>“Consumption of alcoholic beverages during pregnancy even in small quantities, can have serious consequences on the health of the child” or Graphic below:</p> 
Guatemala	“The excessive consumption of this product is harmful to the health of the consumer”, or “The consumption of this product causes serious harm to your health”	
Honduaras	The law states that: “Preventative legends must be displayed on all alcoholic beverage packaging”.	
India (State of Assam)	“Consumption of liquor is injurious to health”	
Mexico	“Excessive consumption of this product is hazardous to health”	
Portugal	“Drink alcohol in moderation”	
South Africa	“Alcohol abuse is dangerous to your health” or “Alcohol reduces driving ability, don’t drink and drive”	“Drinking during pregnancy can be harmful to your unborn baby”
South Korea	One of the three following messages: “Warning: Excessive consumption of alcohol may cause liver cirrhosis or liver cancer and is especially detrimental to the mental and physical health of minors”	“Warning: Excessive consumption of alcohol may cause liver cirrhosis or liver cancer and, especially, women who drink while they are pregnant increase the risk of congenital

	<p>or</p> <p>“Excessive consumption of alcohol may cause liver cirrhosis or liver cancer, and consumption of alcoholic beverages impairs your ability to drive a car or operate machinery, and may increase the likelihood of car accidents or accidents during work”</p> <p><i>On spirits:</i> “Excessive drinking may cause cirrhosis of the liver or liver cancer and increase the probability of accidents while driving or working”</p>	anomalies”
Taiwan	<p>“Excessive consumption of alcohol is harmful to health” or</p> <p>“To be safe, don’t drink and drive”</p> <p>“Excessive drinking is harmful to you and others” or</p> <p>“Please do not drink if you are a minor”</p>	
Thailand	<p>“Warning: Drinking Liquor Reduces Driving Ability” and</p> <p>“Forbidden to be sold to children under 18 years old”</p>	
United States	<p>“GOVERNMENT WARNING: (2) Consumption of alcohol impairs your ability to drive a car or operate machinery, and may cause health problems.”</p>	<p>“GOVERNMENT WARNING: (1) According to the Surgeon General, women should not drink alcoholic beverages during pregnancy because of the risk of birth defects.</p>
United Kingdom (voluntary)	<p>“UK Chief Medical Officers’ recommend men do not regularly exceed 3-4 units daily and women, 2-3 units daily”; or</p> <p>“www.drinkaware.co.uk”; or</p> <p>“Know your limits” or</p> <p>“Enjoy Responsibly” or</p> <p>“Drink Responsibly”</p>	<p>“Avoid alcohol if pregnant or trying to conceive”; or graphic below:</p> 
Venezuela	One of the following warning	

	statements or something similar is required: “The abuse of alcohol beverages can damage the health” “Excessive consumption can be harmful to health”	
Zimbabwe	“(1) Alcohol may be hazardous to health if consumed to excess. (2) Operation of machinery or driving after the consumption of alcohol is not advisable”	

(Adapted from Stockwell, 2006)

It is worthwhile commenting on the nature and visibility of the alcohol warning labels included as Figures 4 to 15, in comparison with the tobacco examples that are later included in Figures 16 to 19. Even a cursory comparison indicates that the alcohol warning labels are less easily identifiable and prominent, represent a small proportion of the size of the overall label, use text and not images (with the exception of France and some labels in the U.K.) and are not particularly graphic. In addition, whereas research from the tobacco field has indicated that for warnings to be most effective they needed to be frequently upgraded (Elliot and Shanahan 2000), the warnings from the U.S. have not altered in over nineteen years. In short, the alcohol warning labels lack what has been considered, in the tobacco field, as essential elements for impact. Subsequently, any review of the effectiveness of alcohol warning labels and interpretation of the related evidence should take these factors into consideration.

Before examining the impact of alcohol warning labels, it is worthwhile briefly examining the history of the introduction of alcohol warning labels in a number of OECD countries where we have been able to access printed matter in English: U.S., Canada, UK, Ireland and in the European Union. A review of the Australian and New Zealand context follows this section.

United States

In 1967, Senator Strom Thurmond first introduced a bill to require health warning labels on alcoholic beverage containers (Scammon, Mayer and Smith 1991). In 1977, the Bureau of Alcohol, Tobacco and Firearms was urged to mandate label warnings of the risks of birth defects associated with the use of alcohol during pregnancy (Scammon et al 1991). In 1979, the U.S. Senate passed and then dropped legislation that would have required warnings to appear on some alcoholic products (Scammon et al 1991). In 1987, a U.S. court suggested that an alcohol beverage manufacturer might have a duty of care to provide consumers with a warning message about health risks (Andreas 1988). In 1988, three lawsuits were brought against seven alcohol companies by parents of children allegedly born with foetal alcohol syndrome, charging that there was not an adequate warning about the potential hazards of alcohol consumption during pregnancy (Moss 1988). In the same year, Congress enacted legislation (Public Law No. 100-690, 1988) mandating that from 18 November 1989, all domestic and imported alcoholic beverage containers for sale in the United States include the following warning message:

“Government Warning: (1) According to the Surgeon General, women should not drink alcoholic beverages during pregnancy because of the risk of birth defects. (2) Consumption of alcoholic beverages impairs your ability to drive a car or operate machinery, and may cause health problems.”

Alcohol warning labels remain mandatory in the U.S. All domestic and imported beverages continue to include the above warnings. For a more comprehensive review of the development of alcohol warning label policy in the U.S. see Kaskutas (1995).

Canada

In February 2005, a Private member’s Bill C-206 received its second reading in the Canadian House of Commons. It had been brought forward by Paul Szabo (Liberal Member of Parliament for Mississauga South) and proposed that the *Food and Drugs Act* be amended by adding after Section 5:

“5.1 No person shall sell a beverage containing more than half of one per cent alcohol by volume unless it bears a clearly printed and legible label, in the form and print size prescribed by the Governor in Council, that warns the consumer that alcoholic beverages impair the ability to operate vehicles and machinery, may affect the health of the consumer and may cause birth defects if consumed during pregnancy.”

In April 2005, the Health Committee prepared a report to the Canadian House of Commons and recommended that Bill C-206 not proceed. At the present time, Canada has no national alcohol warning legislation in place.

United Kingdom

From 1998, voluntary unit labelling on alcohol containers was introduced in the U.K. to support the government’s “Sensible drinking” message and to make it easier for drinkers to associate those messages with the actual amount of alcohol they purchased (Alcohol Policy UK 2008). In May 2007, the Government secured a voluntary agreement with the alcohol industry to introduce, by the end of 2008, labels on alcoholic drink containers showing unit and other health information. In addition, the industry was also asked to include advice to women on the risks of alcohol during pregnancy (Campden & Chorleywood Food Research Association, 2008). In the final two weeks of March 2008, Campden and Chorleywood Food Research Association were commissioned by the Department of Health to undertake a large scale independent market survey to assess compliance with the code. Campden and Chorleywood Food Research Association (2008) concluded that 43.4% of samples had included any slogan or statement, 57% had included any U.K. units information; 15.7% had included any sensible drinking message; 34.7% had included the drinkaware web site information; and 17.9% had included any pregnancy information.

A report by the British Medical Association (BMA) included the recommendation to label all alcohol products with a common standard label indicating the number of alcohol units in the container, the recommended maximum daily alcohol intake and a message that exceeding the recommended alcohol guidelines could result in harm for the individual and to others (BMA Board of Science 2008).

In 2007, Lord Mitchell introduced a private members bill on alcohol labelling to the House of Lords in the U.K. The Bill would require all alcoholic beverage containers (containing alcohol above 0.5% alcohol/volume) to be labelled with the following warning message:

“GOVERNMENT WARNING: Avoid alcohol if pregnant or trying to conceive.”
(House of Lords 2008)

The House of Lords agreed that the Alcohol Labelling Act (2008) become law no later than 1 January 2010 (House of Lords 2008). The Bill was passed by the House of Lords in July 2008 and was sent to the House of Commons, where it currently remains (House of Lords 2008).

Ireland

In 2007, following publication of the report entitled '*The Coombe Women's Hospital Study of Alcohol, Smoking and Illicit Drug Use, 1988-2005*' the Irish Minister for Health and Children asked the Chief Medical Officer (CMO) in the Department of Health and Children to consider the data presented in the study, particularly with respect to the finding that most pregnant women drank alcohol.

Later in 2007, the Department of Health and Children consulted with a number of stakeholders on the proposal to introduce a requirement that alcohol containers and promotional materials carry a label with a health warning about drinking alcohol during pregnancy.

However, as at 9 September 2008, Ireland did not have legislation requiring health warnings on alcoholic beverages (Govt urged to put pregnancy warning on alcohol, 2008).

European Union (EU)

According to information available from the European Centre for Monitoring Alcohol Marketing (EUCAM - established in 2007 by the National Foundation for Alcohol

Prevention in the Netherlands) in February 2006, the Director General on Health and Consumer Protection of the European Commission concluded that health warnings could be an effective means to inform consumers of alcoholic beverages about risk associated with inappropriate consumption of alcohol. Despite this recommendation, in September 2007, the European Parliament rejected calls from its Health Committee to introduce standardized EU-wide health warnings on alcoholic drinks. Instead, members from the European Parliament asked the Commission to initiate a comparative study on the impact and effectiveness of various information and communication means and to publish the report by 2010 (EUCAM 2008).

In January 2008, the European Parliament decided to approve the proposal for mandatory warning labels to appear only on premixed alcoholic beverages and include nutritional information (energy, total fat, saturated fats, carbohydrates, sugars and salts) on the front of packages.

After the rejection by the European Parliament of standardized health warnings on **all** alcoholic beverages, a number of Member states took steps to introduce warning labels themselves. While initially planning to proceed with the introduction of mandatory warning labels (EUCAM (2008)), the Finnish government withdrew plans to proceed with warning labels (Standing Committee on the Food Chain and Animal health Section on General Food Law, 2008).

The Australian and New Zealand context

Based upon information included in a review paper by Alcohol Healthwatch (2003), in 1990 the Joy McLaughlan Broadcast (Liquor Advertising) private members bill requested alcohol advertisements in New Zealand be accompanied by a prescribed health message. The Bill was rejected in favour of a review. The 1997 review rejected the proposal for inclusion of health and safety messages. In response, Labour Party member Dianne Yates tabled a supplementary order paper to the sale of Liquor Amendment Act. This was rejected by parliament. The 1999 supplementary order paper was drafted in to a private members Bill. The Bill was drawn from the ballot in 2000, but failed to reach a majority in parliament.

In 1997, the Tasmanian branch of the National Council of Women (application A306) applied to the Australia and New Zealand Food Authority (ANZFA) for the inclusion of alcohol warning labels. The application was rejected. A similar petition (A359) presented by the Society Without Alcoholic Trauma (SWAT) in 1998 for labels on all alcohol containers to carry the message “This product contains Alcohol. Alcohol is a dangerous drug” was also rejected in 2000. ANZFA conducted a review of the evidence of the effectiveness of alcohol labeling and reached the following conclusion:

“Scientific evidence shows that warning statements are not effective in modifying at risk behaviour in relation to consuming excessive amounts of alcohol, and would therefore not provide any additional protection of public health and safety. Information to enable consumers to make an informed decision or prevent fraud and deception is already provided by existing labeling requirements and public health policies and campaigns.” (ANZFA 2000, p.3)

In addition, ANZFA suggested the costs of introducing alcohol labeling would outweigh the benefits:

“ANZFA has undertaken a regulation impact assessment process which also fulfils the requirement in New Zealand for an assessment of compliance costs. That process concluded that requiring the labeling of alcoholic beverages with a warning statement would offer no clear benefits to government, industry or consumers but would introduce costs to government, industry and consumers.”(ANZFA 2000, p.3)

In the year 2000, the New Zealand House of Representatives received petitions requesting that the House legislate that all alcoholic beverages in New Zealand should carry health and safety messages, including the reference that drinking alcohol during pregnancy can cause birth defects. This petition was referred to the Health Select Committee who considered the literature provided and recommended that mandatory warning labels should be included on all types of alcohol to remind women of the risk of alcohol during pregnancy. The Health Select Committee also recommended that

the labels be should supported by a range of health promotion and education initiatives and research (House of Representatives Health Committee, 2002 as cited in Food Standards Australia New Zealand, 2007)). In February 2003, the New Zealand Government agreed in-principle to ensure that labels should be on all alcoholic beverage containers advising of the potential dangers of drinking alcohol when planning a pregnancy and while pregnant.

In a submission to the NSW Alcohol Summit in 2003, SWAT called for warning labels to be carried on all alcoholic products, warning of the potential significant health risks to particular groups (SWAT 2003).

In February 2006, the Alcohol Advisory Council of New Zealand lodged an application (A576) with FSANZ seeking a variation to existing Standard 2.7.1 to require a health advisory label on alcoholic beverage containers advising risk of consuming alcohol when planning to become pregnant and during pregnancy. FSANZ released a discussion paper for an eight- week period in December 2007. Ninety submissions were received and these have all now been evaluated by FSANZ (www.foodstandards.gov.au 21/01/09).

In May 2008, the Australia and New Zealand Food Regulation Ministerial Council asked FSANZ to consider mandatory health warnings on packaged alcohol. As a result of these two projects the current review was commissioned.

Although neither Australia nor New Zealand have legislated to include health or safety warning labels on alcoholic beverages, it is a requirement under the ANZ Food Standards Code (Standard 2.7.1) for all alcoholic beverages to have their alcohol content expressed by declaration of alcohol by volume and in terms of numbers of “standard drinks”, each equivalent to 10 grams of ethyl alcohol (Stockwell and Single 1997; New Zealand Food Safety Authority 2004).

According to Simpson Grierson (2003), the inclusion of standard drink information was for two main reasons: to bring the labeling of alcoholic beverages in line with other food labeling requirements and, to provide consumers with more accurate

information about standard drinks that would be useful for the “*protection of health and safety of consumers*” (p.2)

Australian research suggests that the inclusion of standard drink labels on containers has a number of advantages (Stockwell and Single 1997). For example, it has been established that standard drink labelling substantially improves the extent to which drinkers can estimate the number of standard drinks in a container and accurately pour a standard drink. It has also been found that labelling is acceptable to consumers (Stockwell and Single 1997), but is more easily located when applied to the front than the back of alcohol containers (Chan, Chan, P’ng and Segarajasingam, 1997). Thus, standard drink labelling assists people to reduce risky alcohol use, encouraging them to adhere to lower risk safe limits. As noted by Stockwell and Single:

“It is too early to evaluate the impact of standard unit labelling on the community at large as no evaluation of this initiative has been made publicly available. A number of experiments, focus group studies and community surveys have, however, examined drinkers’ reactions and their abilities to utilise the information from such labelling. Collectively, the studies provide a strong rationale for the adoption of standard unit labelling and were, indeed, influential in the decision by the Australian government to adopt standard unit labelling in 1995” (Stockwell and Single 1997, p.87).

We are not aware of any major research which updates this position.

Having provided a brief international overview of legislation on alcohol warning labels, the focus will now shift to examining briefly a range of other government and alcohol industry initiatives and then focus on the available literature on the effectiveness of alcohol warning labels.

5.4 Government campaigns and industry initiatives

New Zealand government policy has a strong focus on the prevention of alcohol related harm amongst young people. Consequently, the National Drug Policy 2007-

2012 will incorporate school-based health promotion initiatives, in tandem with consistent family and community-based approaches, so that young people will feel able to make healthy decisions about alcohol use.

On 10 March 2008, the Australian Government announced the \$53.5 million National Binge Drinking Strategy to address the high levels of binge drinking among young Australians. The campaign includes a \$20 million social marketing campaign that will run over two years to confront young people about the costs and consequences of binge drinking. Included in the campaign are a range of print and media promotions.

For more information see:

www.drinkingnightmare.gov.au/internet/drinkingnightmare/publishing.nsf/Content/about-the-campaign

There have also been a range of industry sponsored initiatives aimed at the promotion of responsible drinking. For example, in Australia Lion Nathan have developed and are in the process of introducing www.BeDrinkAware.com.au on packaging and marketplace materials and in 2006 launched the www.drinkresponsibly.co.nz initiative to promote safe drinking behaviours in New Zealand.

Lion Nathan also contribute to DrinkWise Australia, and the “re-thinking Drinking: You’re in control” school based education program in Australia. In New Zealand they contribute funds, through a levy, to the Alcohol Advisory Council of New Zealand (ALAC) and have supported the Students Against Drunk Driving (SADD) program and funding for national teacher development programme for the year 10-12 health education programme as developed and facilitated by the Christchurch College of Education. They have also provided funding for a programme launched by the Foetal Alcohol Support Trust to educate young people about the risks of drinking while pregnant. For more info see: www.lion-nathan.com.au

Similarly, DIAGEO promote responsible drinking through the DRINKIQ.com initiative. DIAGEO have also recently conducted “The choice is yours” responsible drinking campaign in Great Britain, Spain and Germany and the “Students know what’s in it” campaign in Great Britain to provide information about the alcohol content in various alcoholic drinks. As part of their range of programmes and initiatives to support moderate and responsible drinking, in 2005 DIAGEO announced

that the words °Drink Responsibly (or a translation of) would also appear on labels and secondary packaging, and alcohol content (ABV) information would be provided on labels and secondary packaging, the global website and consumer care-lines in markets where there was an agreed definition and recommended guidance on consumption from an authoritative source.

In December 2006, based upon information included in their web site, Pernod Ricard undertook to spread the message of the risks associated with alcohol and pregnancy by printing the pregnant-woman symbol (see similar examples of the image on Figures 12 and 13) on the back labels of all wine and spirit bottles sold throughout the 27 countries of the European Union.

For more information on these and other industry initiatives see:

- www.bdrinkaware.com.au
- www.drinkresponsibly.co.nz
- www.tridentglaobl.com.au
- www.diageo.com
- www.drinkiq.com
- www. Pernod-ricard.com

It is important to note that using the methodology that was previously described for accessing available literature on the effectiveness of alcohol warning labels, no peer reviewed publications on the effectiveness of industry labelling approaches was located. However, in research investigating brewer sponsored counter advertisements, respondents have rated such advertisements as less informative, believable, on-target and effective than conventional public service announcements (Arkin et al, 1992 as cited in Agostinelli and Grube, 2002)

Chapter 6: Studies on effectiveness of alcohol labelling

Forty original research studies were located that specifically investigated the effectiveness of warning labels on alcoholic beverage containers. All but four of the papers were based solely on data from the U.S. Of the remainder, two studies were based on a comparison of U.S. and Canadian data, one was based on data from the U.S. and Australia, and the last paper was from Israel. Six research teams (Andrews et al; the Alcohol Research Group (e.g. Kaskutas, Greenfield, Graves et al); Hankin et al; MacKinnon et al; Mazis et al; Marin et al) had produced a series of publications on the topic representing a substantial proportion of all such publications (n=30 papers), while the majority of other papers were stand-alone/isolated publications. Each paper was critiqued with regard to:

- Strength and appropriateness of methodological design;
- Sound external; and,
- Sound internal validity.

Prior to discussing each paper, it is important to note that the majority of available research had significant limitations. Both Babor, Caetano, Casswell, Edwards, Giesbrecht, Hill et al (2003) and Stockwell (2006) have previously reached a similar conclusion. With very few exceptions (Alcohol Research Group; Creyer, Kozup and Burton 2002) most studies did not include control series (use of a matched comparison sample) and subsequently even though many studies report significant results, these may have been influenced by a multitude of other factors. For example, evidence regarding the impact of drink driving warning labels may have been influenced by other drink driving countermeasures, advertising campaigns, random breath testing and so on. Thus, it is not possible to disaggregate the impact of warning labels from other initiatives. Many studies also had relatively small and/or non-representative samples (e.g. samples of marketing students, African-American pregnant women) and this reduced the overall generalisability of the results.

Bearing these limitations in mind, the following review will initially present a brief synopsis of the major findings from the reviewed research. The findings have been collapsed into three groups to represent whether or not there is strong, moderate or only limited or weak evidence to support the claims. Following this overview, the

papers from the each research group and standalone publication will be reviewed. In the next chapter, the original research will be reviewed collectively using the effectiveness framework described by Argo and Main (2004). For a more detailed synopsis of available research also see Appendix 3. The “level of support” classification system used in Table 2 was based upon the following criteria:

- Strong level of support meant that there was a body of evidence that was based upon research that had used appropriate methodological designs, included samples that were of sufficient size to allow for meaningful analysis to be conducted, had samples that were representative with no or very limited selection bias and where the research had sound internal and external validity;
- Moderate level of support was determined where conclusions were based on a small number of studies (sometimes only one study) and/or those studies that were available had a number of design/methodological limitations;
- Weak level of support was determined where conclusions were based on studies with significant design/methodological limitations.

Table 2 Summary of major findings

Finding	Level of support from the available research
Over time more people will become aware of the existence of warning labels	Moderate
Depending on the message and the characteristics of the individual, people who are aware of the presence of warning labels are able to recall the messages included	Moderate
Warnings on the link between alcohol and the risks of drinking during pregnancy are believable	Moderate
Warnings on the link between alcohol and the effect of alcohol on driving impairment are believable	Moderate
Those people who see labels are more likely to have conversations about the risk of drinking and driving	Moderate
Those people who see labels are more likely to have conversations about the risk of alcohol during pregnancy	Moderate
Some groups, such as young people and heavier drinkers, may be more aware of the warning labels	Moderate
Exposure to more than one message source (e.g. warning label, poster, advertisement) has a greater impact on knowledge and behaviour	Weak-Moderate
Warning labels had no effect on intentions regarding future consumption	Weak-Moderate
Recall of warning labels may be associated with an increase in the proportion of people driving when they knew they would be in trouble with the police and conversely increase the proportion who report they had limited their drinking because of driving	Weak-Moderate
Warning labels may be associated with a collateral intervening to deter another person from drinking and driving	Weak-Moderate
Warning labels are associated with a reduction in consumption amongst women pregnant for the first time	Weak
Warning labels are associated with an increase in rating alcohol as beneficial and increase intentions to drink	Weak

6.1 Papers from research groups

1. Andrews et al studies – 1990 to 1993

Prior to the introduction of the mandated alcohol-warning legislation in the U.S., there had been some suggestions by policy makers and citizen groups that five warnings be included. These were:

1. *GOVERNMENT WARNING: According to the Surgeon General, women should not drink alcoholic beverages during pregnancy because of the risk of birth defects.*
2. *GOVERNMENT WARNING: Consumption of alcoholic beverages impairs your ability to drive a car or operate machinery, and may cause health problems*
3. *GOVERNMENT WARNING: The consumption of this product, which contains alcohol, can increase the risk of developing hypertension, liver disease, and cancer.*
4. *GOVERNMENT WARNING: This product contains alcohol and is particularly dangerous in combination with other drugs.*
5. *GOVERNMENT WARNING: Alcohol is a drug and may be addictive.*

Prior to 18 November 1989 (when legislation came into effect in the U.S.), Andrews, Netemeyer and Durvasula (1990) conducted interviews with 273 undergraduate marketing students from two universities to determine the believability of and attitudes of the students toward alcohol warning information. The authors were also interested in investigating whether prior attitudes and beliefs toward drinking mediated the influence of the different labels. Students were each given one of the above five randomly assigned alcohol warning labels and were then required to answer questions regarding the believability of the label and attitudes toward information contained in the label.

Results indicated that the birth defects and driving impairment labels were perceived as significantly more believable than the other three labels. As Andrews et al (1990) indicated, it was not possible to determine if this result was due to the content of the

message or the perceived credibility of the source i.e. the warning on birth defects was the only message that included reference to the Surgeon General.

Prior attitudes and beliefs toward drinking had a significant impact on believability. That is, the more favourable the respondent's attitudes towards drinking, the less they believed the birth effects, driving impairment and drug combination warning labels. The authors concluded that their research suggested a defensiveness on behalf of those who enjoy drinking and implied that alcohol warning labels fall on "blind eyes" and "deaf ears" of those who may need the warnings the most. This is consistent with health beliefs research discussed earlier – that there exists a "self-serving optimism." It is also consistent with a heuristic- systematic processing analysis, where individuals will judge a message as less valid or accurate when the message is incongruent with their personal beliefs and attitudes.

The research by Andrews et al (1990) produced some interesting results but did have a number of limitations. Firstly, all students were marketing students and hence not representative of the general university population nor the broader population. Secondly, the labels were placed on bottles of low alcohol beer and wine coolers only. This was not controlled for as a variable. This methodology may have influenced the results, particularly the believability of the messages on the low alcohol beer. Finally, the authors did not include any information on how attitudes and beliefs were assessed making further analysis and comment difficult.

Andrews, Netemeyer and Durvasula (1991) produced another report using their data from 1989 with 273 undergraduate marketing students. In this study, the authors were interested in investigating believability of each label in relation to a students self reported level of consumption. As in the earlier report, the authors investigated five labels, focussing on:

- a) alcohol and birth defects;
- b) alcohol and driving etc.;
- c) alcohol and hypertension, liver disease and cancer;
- d) alcohol is dangerous in combination with other drugs; and,
- e) alcohol is a drug and may be addictive).

A multivariate analysis of variance was used to examine the overall influence of consumption frequency (frequent versus occasional/non user) and warning label type on believability toward the label, attitude toward the label and attitude confidence. Label believability and attitude were not significantly different amongst the sample, but there was a significant effect on label attitude confidence ($F = 5.78$, $df = 1, 263$, $p < 0.017$) indicating that frequent alcohol users had a less positive attitude towards the warning labels than occasional or non users. No information was included in the on-line production of the paper that indicated how students were presented with the labels. Other limitations previously discussed- see Andrews et al (1990) - also apply to this 1991 publication.

Andrews, Netemeyer and Durvasula (1993) produced a further report on their 1989 data, noting that of the 273 undergraduate students, 94 % were classified as frequent (greater than once per week) alcohol consumers. This component of their investigations explored cognitive responses (support for and against inclusion of particular labels) to determine persuasiveness of the labels. As in the earlier report, the authors investigated five labels, focussing on:

- a) alcohol and birth defects;
- b) alcohol and driving etc.;
- c) alcohol and hypertension, liver disease and cancer;
- d) alcohol is dangerous in combination with other drugs; and,
- e) alcohol is a drug and may be addictive.

Of the five labels presented, alcohol and birth defects had more support than any other label. Further research by the same authors with the same sample indicated that the alcohol and birth defects message was also viewed as most believable compared to other labels. However, all labels were seen as more rather than less believable.

The research by Andrews et al did indicate that health warning messages about alcohol and birth defects were believable. However, as previously mentioned, the researchers used only light beer bottles and wine cooler bottles. The use of light beer as opposed to higher alcohol by volume beverages may have influenced the perceptions of the respondents and hence the internal validity of the data. Additionally, as discussed the sample was not representative of university students in

general, nor of the general population and inadequate information was provided to enable a critique of the validity and reliability of measurements instruments used. Finally, one consideration is whether alcohol and birth defects may be more believable because it may have less personal relevance, at least for some respondents, such as males, as would be predicted by some of the work on health beliefs.

2. Alcohol Research Group – Kaskutas, Graves and Greenfield studies – 1991 to 1999

1991 – Public support for warning labels

To ascertain the level of public support for the introduction of alcohol warning labels Hilton and Kaskutas (1991) examined data from telephone interviews conducted in 1989, six months prior to the implementation of the alcohol labelling legislation with 2,006 adults randomly selected from across the country. Participants were asked: “Do you think alcoholic beverages should have warning labels about possible health hazards?” Participants were then asked to agree or disagree with the statement “I would vote for a law requiring health and safety warning labels on all alcoholic beverage containers.” Respondents were also asked about their alcohol consumption using the graduated frequency approach (Hilton 1989). The introduction of alcohol warning labels was supported by 87% of respondents, although this support was found to be higher among abstainers (97%) and low-level drinkers (90%) as compared to heavier drinkers (73%). In other words, the less alcohol consumed the more support for warning labels. When compared to other alcohol policies, education programs (88%) and warning labels (87%) had more support than policies that involved store hours (37%) and drinking age (32%). Although support for warning labels was high, 89 % of respondents also reported that in their opinion, it would have little effect on heavy drinkers and 69 % of respondents reported that people already knew about the health risks related to alcohol consumption. The authors suggested that the government’s duty to inform consumers of the health risks associated with alcohol consumption would receive overwhelming support from the public.

1992 – Awareness of warning labels pre and post legislation

Kaskutas and Greenfield (1992) used data collected from the earlier study (Hilton and Kaskutas 1991) and compared it with data collected from a second similar survey of

2,000 adults during June, July and August in 1990. In addition to questions about alcohol warning labels, participants were asked about their own consumption of alcohol using the graduated frequency approach (to estimate drinks per month respondents were asked how often over the past 12 months they had consumed 12 or more drinks per day, 8-11 drinks, 5-7 drinks, 3-4 drinks and 1-2 drinks) (Hilton 1989). Finally, respondents were asked questions that related to behaviours targeted by the warning labels.

At six months post the introduction of the health warning labels, greater proportions of key target groups, such as heavy (defined as consuming 5 or more alcoholic drinks at least once per week) drinkers (39%), young men at risk for drink driving (46%) and women of childbearing age who were heavy drinkers (39%) reported seeing the warnings. Initial apparent knowledge levels about the risks of alcohol were already high in 1989, with over 95% of the sample responding that each of the hazards identified on the labels was true. In 1990, this figure was 97% (no significant change). That the change was not significant was not surprising considering how high apparent knowledge levels were in 1989. In relation to differences in behaviour between 1989 and 1990, no statistically significant changes in behaviour were found between 1989 and 1990, with the exception of a 3% increase in the number of respondents reporting that they had used machinery after drinking.

When analyses were conducted to assess the behavioural differences that might be associated with seeing the label, significantly more respondents who had probably seen the label reported:

- They had driven when they would have been in trouble if stopped by the police (22% versus 10% who did not see the label);
- Limited their drinking because of driving (73% versus 56%); and,
- Had conversations about drunk driving (74% versus 65%) and about pregnancy (58% versus 45%).

1993 – Public attitudes towards alcohol policies after the introduction of mandated warning labels on alcohol containers

To assess changes in public attitudes after the introduction of alcohol warning labels Kaskutas (1993a) used data collected from the earlier study (Hilton and Kaskutas 1991) and compared it with data collected from a third similar survey of 2,017 adults during June, July and August in 1991. Respondents were asked about warning labels on alcoholic beverages and their consumption of alcohol using the graduated frequency approach (Hilton 1989). Prior to the implementation of alcohol warning labels, public support for the introduction of warning labels was at 87% and this had statistically significantly increased to 91% in 1991. When compared to other alcohol policies, warning labels were the only policy for which public support had increased. Exposure to the warning label was also found to be positively associated with support for the policy.

While the research did demonstrate a high level of support for the policy, the majority of respondents in both surveys indicated that *in their opinion* warning labels would have limited impact on heavy drinkers (87% of sample in 1991 and 89% of sample in 1989). Additionally, over the two-year study period there was a decrease in the impact of the label heightening individual's perception of risk. For example in 1989, 60% of respondents agreed with the statement: "If you saw a warning label on a bottle of whiskey or wine, would you think that this is really something dangerous, not an ordinary product?", this decreased to 53% in 1991.

In a similar study, Kaskutas (1993b) using the same data set of 2,017 adults who were interviewed in June, July and August 1991, aimed to investigate whether:

1. Respondents would see the warning label as less likely than taxes to affect people's drinking;
2. Heavier drinkers would perceive both policies as affecting their own drinking;
3. Heavier drinkers would be less likely to support either policy
4. Those who supported either policy would be more likely to believe the policy would not affect their drinking.

One third of respondents indicated that in their opinion warning labels had affected moderate drinkers, while only 14% believed that warning labels affected heavy drinkers. Many more respondents (55%- no information was included as to whether or not this was statistically significantly higher) said that labels had affected their own

drinking (respondents were not required to indicate in what way drinking had been affected). Heavier drinkers (defined as defined as consuming 5 or more alcoholic drinks at least once per week) were significantly less likely than moderate drinkers to believe that the label had affected their own drinking (chi square = 77.6, $p < 0.00001$).

1993 – Warning label message recall and drinking style

In a companion piece to their 1991 publication Greenfield and Kaskutas (1993) used data from the telephone surveys from 2,000 U.S. participants, six months after alcohol warning labels had been introduced, to examine the association between message recall and drinking style. About 25% of participants reported seeing the warning label and of those 16% could recall the message about drinking and driving. Of the participants classified as heavy drinkers (5 or more drinks per occasion who drink at least weekly), almost half reported noticing the warning label and of those about 61% recalled the message about drinking and driving. On a population basis, this implied that only 28% of the group at risk had “received” the driving impairment message six months after the warning. However, 34% of heavy drinkers who reported never drinking and driving recalled the message while only 11% of lighter drinkers who had also never drunk and driven were able to recall the message. Results indicated that both heavy and light drinkers who saw the label were more likely to report limiting their drinking when driving and to report avoiding driving when drinking than heavy and light drinkers who did not see the label. The authors noted that their results supported the conclusion that risk perceptions are mediating variables that are plausibly amenable to influence from prevention interventions such as warning labels.

1994- Relationship between exposure to health messages and behaviour

Using telephone data from a nationally representative sample of adults, Kaskutas and Graves (1994) investigated exposure to the alcohol warning message on alcoholic beverage containers, warning posters in restaurants and bars and media advertisements. The outcomes assessed were:

- Knowledge of the alcohol-related risk of birth defects;
- Conversations about drinking during pregnancy; and,
- Self reported reduction of alcohol consumption due to health concerns.

Based upon data gathered in 1990 and 1991 (n= 4,017, adults over 18 years of age), over 80% of the sample reported exposure to at least one message source about drinking during pregnancy. Amongst women of child-bearing age (defined as 40 years and under) 47%, 26% indicated that they had seen two message sources, and 8% said they had seen three message sources (no information was provided on which message source women were exposed to).

Twice the proportion of heavy drinkers compared to moderate drinkers reported seeing all three message types. No significant differences were found for income or ethnicity.

Multivariate logistic regression models were applied and those individuals who were exposed to one, two or three messages were significantly more likely (minimum odds ratio=1.85, $p<0.0001$) to be aware of the risk of birth defects associated with drinking than those who said they had not seen any of the warnings. Compared to those who said they had not seen any warning label, poster or advertisement about the risk of alcohol during pregnancy, those reporting a single exposure were twice as likely to say they had a conversation about drinking during pregnancy (odds ratio=2.58, $p<0.0001$), those reporting two exposures were more than three times as likely (odds ratio= 3.83, $p<0.001$) and those who said they had seen all three were four times as likely (odds ratio=4.11, $p<0.0001$) to report a conversation on the topic.

When considering whether respondents had limited their drinking in the past 12 months due to health concerns, there was no significant relationship between seeing a single message and reducing consumption. However those that were exposed to two message types were over one and a half times more likely (odds ratio=1.64, $p<0.01$) than those who had not seen any message. Those exposed to all three message sources were twice as likely to reduce their drinking due to health concerns (odds ratio= 2.03, $p<0.01$).

Among women of child bearing age, significant predictors for conversations about drinking during pregnancy included knowledge of the birth defect risk (odds ratio=1.90, $p<0.05$), exposure to a single warning source (odds ratio=2.61, $p<0.00001$), exposure to two warning sources (odds ratio=3.72, $p<0.0001$), exposure to all three warning types (odds ratio=3.96, $p<0.0001$), and having been pregnant in the

last year (odds ratio=4.68). Among this group of women, exposure to one or even two message sources did not predict having limited consumption of alcohol for health reasons. However, women who were exposed to all three message sources were over two and half times as likely than those not exposed to any message source to reduce consumption (odds ratio=2.83, $p<0.00001$). Thus, there is some evidence that exposure to multiple message sources was associated with increased awareness, increased discussion and changes in behaviour.

1997 – Health consciousness and attention to warning labels

Kaskutas and Greenfield (1997) suggested that the level of an individual's health consciousness may have an impact on the attention and exposure to health messages. In other words, the higher an individual's level of health consciousness, the more likely they will notice and pay attention to health messages regarding alcohol consumption. Using data collected from 1,026 participants in 1993, the researchers examined whether the health consciousness of an individual was more likely to draw their attention to health messages about alcohol. This may be consistent with evidence found in relation to health beliefs research, discussed above – indicating that those with higher health consciousness and who may have beliefs/goals congruent with health messages may evidence more personal impact arising from messages about health.

Respondents were asked about their alcohol consumption: "During the last 12 months, how often did you drink: 12 or more drinks per day; eight to 11; five to seven, three or four, one or two?" Respondents were then classified as abstainers, moderate drinkers or heavy drinkers (consumed five or more drinks during 1 day at least once in the past 12 months and who drank at least weekly). Participants were then asked "Now thinking about the last 12 months, have you seen any warning labels on bottles, or cans of beer, wine or liquor?" "Have you seen any signs in bars, restaurants, stores, or other places that warn people about drinking?" "Do you recall having seen or heard any advertising messages dealing with drinking?" A health consciousness scale was then developed from five health related questions asked of participants and salience of alcohol-related health warnings was also measured using participant responses to nine alcohol-related problems.

Risks associated with alcohol consumption were reportedly seen in advertisements by 94% of respondents, 39% reported seeing the warning labels and 34% had seen a poster. Respondents aged 18 to 20 paid more attention to warning labels than any other age group. Health consciousness was not significantly associated with attention paid to warning labels or posters. Of those respondents who reported seeing the warning label, 86% recalled the message about health risks, 78% recalled the birth defects message, 44% recalled the drink driving messages and 63% recalled the operating machinery message. The birth defects message was recalled by 89% of respondents aged 40 and younger, for whom such a message is more likely to be relevant, compared to older respondents.

The ability to recall messages about the risks of operating machinery was higher among younger respondents (69%) and heavier drinkers (77%). No significant association was found between the attention paid to an alcohol warning label and an individual's level of health consciousness. However, as acknowledged by the authors, this study does not investigate how much individuals were exposed to a variety of other sources for alcohol-related health risks such as newspapers and radio. Nonetheless, these results suggest that warning labels are not just noticed by individuals who may be concerned with their health.

1998 – Awareness of warning labels over time

Building on earlier studies, Greenfield and Kaskutas (1998) examined the longer-term impact of warning labels by comparing data gathered from with interviews conducted in 1989 (n=2,006), 1990 (n=2,000), 1991 (n=2,017), 1993 (n=1,026) and 1994 (n=1,016). To assess awareness of warning labels all participants were asked: "Now thinking about the last 12 months, have you seen any labels on bottles or cans of beer, wine or liquor?" A positive response was followed up by further questions to determine recall of content of messages: "Did the warning label say anything about...birth defects?...drunk driving?...operating machinery?" Behaviour change was then assessed with the following questions: "In the last twelve months....Did you deliberately decide not to drive a car because you felt that you had too much to drink?" and "Have you had any conversations in which-the dangers of drinking during pregnancy were mentioned?"

In 1990, 21% of participants recalled seeing the warning labels containing messages about alcohol and pregnancy and drinking and driving. In 1994, this figure increased to 51%. These results suggest an increase in awareness of warning labels on alcoholic beverages. Further analysis of data revealed that by 1994, 56% of female participants aged between 18 and 40 correctly recalled the pregnancy warning. However, there was some evidence to suggest that awareness of the warning labels and recall of its message appeared to plateau from four to five years after the labels introduction.

The authors did note that there was no effect seen between label exposure and alcohol consumption among women who were pregnant. However, they did caution that this conclusion was based on a small sample size (however no information was included in the report on the numbers of pregnant women included) and that consumption of alcohol amongst the sample was low overall with only 4% acknowledging drinking more than three drinks in a day. Because consumption of alcohol was low, detecting any reductions would be difficult.

Data also indicated that by 1994, 38% of men aged 18 to 40 correctly recalled the warning about drinking and driving. Over the five years that data were collected, those drinkers who recalled seeing the message about drinking and driving were significantly less likely to report driving after drinking. Only in the 1993 survey was this relationship for heavier drinkers not observed.

1993 and 1999 – Comparison of U.S. and Canada

Between 1989 and 1991, Graves (1993) conducted four cross sectional surveys with a random sample of a 2,000 U.S. and 1,000 Canadian adults. As Canadian law did not require that alcohol beverage containers include health warnings, Canada was chosen as a research site to provide a control group. In 1991, 35% of U.S. participants reported seeing the warning labels in the last twelve months compared to 19% in Ontario. Viewing the label was also more likely to lead to discussions with others about pregnancy and alcohol consumption.

In 1994, in follow up research, more data from participants in both the U.S. and Canada were collected (Greenfield, Graves and Kaskutas 1999). Analysis of all data excluded any participants who reported never consuming alcohol over their lifetime.

In 1990 in the U.S., 30% of the 1,700 participants reported seeing the warning labels on alcohol beverages and in 1991, this had increased to 39% of the 1,768 participants and up to 43% of 868 participants in 1993 and 43% of the 907 participants in 1994. In comparison, 16% of the 1,001 Canadian participants reported seeing warning labels on alcohol beverages in 1990; this increased to 19% of the 985 participants in 1991 and decreased to 15% of 985 participants in 1993 and down to 12% of the 973 participants in 1994. An explanation of how Canadian participants may report seeing the warning labels on alcoholic beverages could be due to travelling to the U.S., some imported products from the U.S. may also have warning labels printed on them and then be sold in Canada and it is possible that part of the figures may be a result of affirmation bias¹.

Further analysis of U.S. participants' data found that heavy drinkers (defined as those who consumed alcohol at least weekly and on occasion consumed five or more drinks) and participants who were aged between 18 and 29 were more likely to report seeing the health warning label. To ascertain participants' ability to recall the warning label message, they were presented with five health warning statements (three correct: i.e. birth defects, drinking and driving; operating machinery - all of which appear on warning labels - and two incorrect: cancer; arthritis) and were asked to indicate which messages they recalled seeing on the alcohol warning labels. For the U.S., over the four years of the study, results were fairly consistent each year, with approximately 80% of participants reporting the warning label mentioned birth defects, about 46% mentioned drinking and driving and about 56% mentioned operating machinery. For the two incorrect messages, approximately 17% of U.S. participants incorrectly reported the warning label mentioned cancer and about 3% reported the label mentioned arthritis. In comparison, about 42% of Canadian participants reported the warning label mentioned birth defects, 65% reported drinking and driving and 42% reported operating machinery. For the two incorrect messages, approximately 12% of Canadian participants incorrectly reported the warning label mentioned cancer and about 3% incorrectly reported arthritis.

¹ Affirmation bias: a respondent may adjust consciously or not, his/her responses to that what he/she thinks the interviewer expects to hear

A greater proportion of participants who had read a warning message about drink driving on an alcoholic beverage were more likely to report having a conversation in which the dangers of drunk driving were mentioned than those who had not seen the warning label (Greenfield et al 1999). Overall, the results suggested that awareness of labels may generate discussions of the risks associated with alcohol consumption but there no direct causal link was identified. It is also important to note that apparent discussions of risks and apparent behavioural intent (e.g. drink driving) were based on self-report, with no confirmation of the reliability and validity of these reports.

2008- Impact of warnings on third parties

To test the hypothesis that those people who had seen and could recall the alcohol and drink driving warning message were more likely than others to intervene so as to deter another person from driving when intoxicated Tam and Greenfield (2008) analysed cross-sectional self-report data from 1,376 men and women that was gathered in 1993 and 1994. Label and message recall were assessed by the questions: “Now thinking about the last 12 months, have you seen any labels on bottles or cans of beer, wine or liquor?” and “Did the warning label say anything about drunk driving?”. Average number of drinks per day was assessed and a dichotomous measure of three or more drinks per day was used to indicate higher consumption. Finally, container handling was also assessed. Interventions to deter drink driving were assessed by the following series of questions:

- Have you asked someone not to drive?
- Have you offered to drive someone home yourself?
- Have you asked someone to take a taxi, bus or subway?
- Have you tried to take someone’s car key?
- Have you asked someone to stay at your home?

Response categories for each of the above questions were binary. Results indicated that usual consumption of three or more drinks on a drinking day (standardised $B = 0.28$), greater handling of alcoholic beverages ($B=0.08$) and recall of the drink driving message ($B=0.08$) all had significant positive effects on the intervention factor. While men were more likely than women to usually consume three or more drinks ($B=0.30$), handle alcoholic beverages ($B=0.13$), and recall the drink driving message ($B=0.09$), they were less likely to intervene to deter others from drink driving ($B=-0.11$).

This research lends support to the possibility that warning messages may enhance a third party to attempt to intervene in another persons attempt at drink driving. Further longitudinal research on the impact of health warnings on social norms or collateral behaviour is warranted however, before any definitive causal conclusions can be drawn. This is consistent with some of the research on health beliefs, and the recommendations by Isaac (1995 as cited in Agostinelli & Grube, 2002) which indicates that the influence of health messages, such as those delivered through warning labels or other media, may be mediated through interpersonal interactions.

Summary

The work of the Alcohol Research Group indicated there was strong public support for the introduction and continued use of alcohol warning labels in the U.S. People who had reported seeing alcohol warning labels were more likely to report discussing the risks associated with alcohol consumption and over time there was a decrease (amongst those people who recalled seeing the warning labels on drinking and driving) in the proportion of respondents reporting that they drove after drinking when they probably should not have. The authors also concluded that within four years after the introduction of warning labels awareness appears to plateau. Greenfield and Kaskutas (1998) suggest that “the meaning of this is not entirely clear, but the age results seen here, especially for those in the under-age group, serve to remind us that new cohorts of drinkers are coming on line, bombarded by youthful depictions in the *cut loose vein*” (P.65). Research by Kaskutas and Graves (1994) is noteworthy for highlighting the potential cumulative impact of multiple message sources. The findings of Greenfield and colleagues are particularly noteworthy as the research program by the Alcohol Research Group was methodologically rigorous. The cross sectional research was based on data from randomly sampled nationally representative adults and two research studies included the use of a matched control (ie. Canada vs U.S.). Assessment of alcohol consumption was based on the use of previously validated measures and conclusions were restricted to the data analysis in each study. The research by the ARG has also previously been recognised by Stockwell as “*the strongest design of all the others that were conducted to evaluate the impact of any alcohol warning labels, and most weight should be placed on its findings*” (Stockwell 2006 p.5).

3. Hankin et al Studies from 1993 to 1998

Hankin and colleagues have been involved in five studies to examine what impact alcohol warning labels have on the awareness and behaviour of pregnant women.

1993 – Awareness of alcohol warning labels and alcohol consumption

Between 1989 and 1991, 4,397 African-American pregnant women were interviewed in Detroit to ascertain their self-reported alcohol consumption and knowledge of the existence of warning labels on alcoholic beverage containers (Hankin, Firestone, Sloan, Ager, Goodman, Sokol, and Martier 1993). Women were questioned about the average amount of absolute alcohol consumed in the week of conception and the average amount of alcohol consumed during a two-week period at the time of their first prenatal visit. During the week of conception, 44% of women reported not drinking alcohol, 42% were assessed as consuming less than 0.5 ounces of absolute alcohol per day and 14% were identified as drinking 0.5 ounces or more of absolute alcohol per day. At the prenatal visit, 81% of pregnant women reported not consuming alcohol at all during pregnancy, 17% were classified as lighter drinkers and 2% were identified as high risk drinkers who consumed more than 0.5 ounces of absolute alcohol per day. Women were asked at the interview “Is there a warning label on alcoholic beverages (something that may affect your health)?” and responses were coded as yes, no or don’t know.

Prior to the warning labels on alcohol beverage containers being introduced in November 1989, 35% of pregnant women interviewed between May and 18 November 1989 reported a false-positive (seeing the warning label when no warning labels were actually yet on alcohol beverage containers). From 19 November 1989 to May 1990, 37% of pregnant women interviewed reported seeing the warning label and this increased to 56% of women interviewed between June 1990 and September 1991.

Self-reported alcohol consumption of pregnant women in the period prior to the introduction of warning labels and the period after the warning labels had been introduced, showed no significant changes. Prior to the introduction of warning labels on alcohol beverages, 80.4% of women reported abstaining from alcohol, 17.5%

drank less than 0.5 ounces of absolute alcohol per day and 2.2% reported consuming more than 0.5 ounces of absolute alcohol per day. After the warning labels on alcohol beverages had been introduced, 81.7% of women reported abstaining from alcohol, 16.4% drank less than 0.5 ounces of absolute alcohol per day and 1.9% reported consuming more than 0.5 ounces of absolute alcohol per day. These results suggest that for this population of pregnant women, the introduction of warning labels on alcohol beverage containers did not significantly change their drinking behaviour.

After further analysis of the data, taking into account some demographic and consumption variables, Hankin et al (1993) made a number of conclusions. These were: whilst the introduction of warning labels on alcohol beverage containers may be linked to a reduction in alcohol consumption by light or moderate drinkers (those that consume less than 0.5 ounces of absolute alcohol per day), it had no impact on the alcohol consumption of pregnant women who consumed more than 0.5 ounces of absolute alcohol per day. Secondly, although at-risk drinkers were exposed to the warning labels more often, this did not appear to have an impact on their alcohol consumption.

As Hankin et al (1993) acknowledged, all participants in the research were inner city African-American pregnant women from the United States and 85% of this population were receiving welfare. As the sample was atypical, it limits the generalisability of the results to other populations. A further limitation was that women were questioned as to whether or not they had seen the warning labels on alcohol beverage containers, but were not actually required to identify or recall the content of the message. Consequently, whether the women actually saw the label or whether the message the warning label was trying to impart was recalled was not identified. There were no study controls that would make it possible to ascertain what role exposure to warning labels had independent of other variables (e.g. advice from health professionals, mass media campaigns).

1996 – Awareness of the alcohol warning label

A further study by Hankin, Sloan, Firestone, Ager, Sokol and Martier (1996a) expanded on the original dataset collected in the 1993 study, to monitor changes in

awareness of the alcohol warning messages for 7,334 pregnant African-American women from 1989 to 1993. Results indicated that from 1989 to 1993, the level of awareness of alcohol warning labels increased from 29% to 78%. Over the four-year period, awareness of the warning label was reported by 57% of all women interviewed. At-risk drinkers reported the greatest awareness of labels (63%), followed by non-risk drinkers (59%) and non-drinkers (53%). These results suggest that increased exposure to the warning labels may result in increased awareness of warning labels. Analysis of all interviews conducted over the four years found that 84% of women who reported drinking at the time of conception (n=4,028) reported that they were also aware of the warning labels on alcoholic beverages. Interviews conducted in 1992 and 1993 found self-reported awareness of warning labels on alcoholic beverages had not changed substantially, indicating that about 80% of people in this population who consume alcohol will also report seeing the warning label. Older women were less likely to report being aware of the label and those who consumed more alcohol, and therefore categorised as 'at-risk' drinkers.

As with earlier research (Hankin et al 1993) this study had significant limitations. The sample was not representative of pregnant women and hence the results cannot be generalised. Participants were not asked to recall the content of the message they had seen and therefore, although they may have reported seeing the label, this may not have been the case. In addition, the sample had low literacy levels and as research in the tobacco field has demonstrated, some text only health warnings may require college level education to comprehend (Malouff et al 1992).

1996 – Alcohol consumption for pregnant women who have previously given birth versus those pregnant for the first time.

The examination of alcohol consumption for expectant mothers was the basis of a further study by Hankin, Firestone, Sloan, Ager, Sokol and Martier (1996b). Data from 17,456 African-American inner-city women seen at a prenatal clinic between September 1986 and September 1993 was examined. Self-reports of alcohol consumption during pregnancy confirmed that 81% of pregnant women abstained from alcohol. Of the 19% that reported drinking alcohol, 42% had not previously given birth and 58% had. Analysis of these results found that at conception women for whom this was not their first pregnancy reported greater consumption of alcohol

than the pregnant women for whom this was their first pregnancy (0.34 oz. vs 0.17 oz) and similar results were obtained for alcohol consumption at their first antenatal visit (0.06 oz vs 0.02 oz). After the introduction of warning labels on alcohol beverages, alcohol consumption for first time mothers decreased, whereas for mothers who had previously given birth, the warning labels on alcohol beverages appeared to have no impact on their alcohol consumption during pregnancy.

These results suggest that women who previously had given birth and consumed alcohol during pregnancy with no apparent alcohol-related birth complications, may not change their drinking behaviour after exposure to warning labels. On the other hand, women who are pregnant with their first child may actually change their drinking behaviour as a precaution to minimise any alcohol-related health risks with their pregnancy. However, changes in drinking behaviour could not be attributed wholly to the introduction of warning labels on alcohol beverages as women also receive information from other sources and as no controls or measures allowed analysis of such impacts, it is impossible to account for any such possibilities.

1998 - Awareness of alcohol warning labels and alcohol consumption

Awareness of alcohol warning labels and their impact on alcohol consumption was examined in a study Hankin, Sloan and Sokol (1998) that analysed interviews from 21,127 inner city African-American pregnant women presenting at an outpatient clinic in Detroit, Michigan from 1987 to 1994. Over this period of time the percentage of pregnant women abstaining from consuming alcohol at the time of conception decreased from 48.5% to 37.3%. In 1987 the average daily amount of absolute alcohol consumed was 0.213 ounces and by 1994 this had increased to 0.397 ounces. Overall results suggested that whilst 82% of pregnant women reported abstaining from alcohol during pregnancy, 18% continued to consume alcohol during their pregnancy. Of the women who consumed alcohol, the average amount of alcohol consumed was 1.5 ounces per week.

The limitations of this study were similar to those found in earlier studies by Hankin et al (1993; 1996a; 1996b). All participants were inner-city African-American pregnant women who attended a University clinic for their pregnancy, therefore the

ability to generalise the results from this study to all pregnant women is inadvisable. In addition, whether the women reported seeing or recalling an alcohol health label was not controlled for as an independent variable. Subsequently, it is impossible to determine what specific impact, if any, alcohol warning labels had on the results. Another limitation of the study was that women were interviewed at very different stages of their pregnancy (26% interviewed in their first trimester, 47% in the second trimester and 27% in their third trimester). This may also have impacted upon recall of drinking and affected the results as it was not adequately controlled for in the analysis.

1998 - Awareness of alcohol warning labels and alcohol consumption

To examine the awareness of alcohol warning labels among women and the impact of this on alcohol consumption, Hankin (1998) analysed data from 1,107 women who participated in a 1995 Detroit Metropolitan Area Public Policy Survey (DMAPPS). During the interview, women were asked: "Have you seen any warning labels on bottles or cans of beer, wine, liquor or wine coolers during the past 12 months?" Women reporting they had seen the label were then asked about the actual message itself and were requested to identify whether they had seen 3 correct messages (birth defects, drink driving, or operating machinery) and 2 incorrect messages (arthritis and cancer). In the previous 12 months, 39% of participants reported seeing the warning label on alcohol beverages. However, when women who had not consumed alcohol in the last 12 months were eliminated, this increased from 39 to 52%. As the frequency of the amount of drinks consumed per week increased, so did the reported exposure of the warning label. Of the 405 women who reported seeing the warning label, 77% recalled the warning about birth defects, 51% recalled the operating machinery message and over a third reported seeing the drink driving warning. In addition, of all the women who reported seeing the warning labels only 24% could correctly identify the three messages that did actually appear on the warning labels and the two messages that did not appear. Similar to an earlier study by Hankin et al (1996a) older women were less likely to see the label and if they did report seeing the label were more likely not to recall the actual message of the warning. Women who did not consume alcohol frequently were more likely not to be able to recall seeing a warning label and, if they did, were more likely not to recall the message. This supports the

idea that more exposure to the warning label by more frequent drinkers can result in more women seeing and recalling the message on the warning label.

Despite the limitations of the research (i.e one metropolitan area; no control group or site) the research does indicate that six years after the introduction of alcohol warning labels, 52% of women who drink alcohol recall seeing a warning label.

Summary

In all of the studies conducted by Hankin and colleagues, the evidence indicated that awareness of the warning labels on alcohol beverages has increased over time. Hankin's research also indicated that amongst the African American women who participated in the research, those who have conceived before were less likely than first time mothers to reduce their alcohol consumption as a result of exposure to the warnings on alcohol beverage containers. However, as already discussed, there were significant design limitations with all the research, making any generalisations to other pregnant women difficult.

4. MacKinnon studies – 1993 to 2001

MacKinnon (1993) investigated the efficacy of alternative alcoholic warning labels in two studies with undergraduate students enrolled in a psychology course at Arizona State University. In the first study, an initial 89 students (no information was provided on the numbers of males or females) were asked the following two questions: 1) Faced with a choice between a beer can with a poison label on the cover and another with a blank label which would you select? 2) Faced with a choice between a beer can with a toxic label on the cover and a blank label which would you select? Twenty two other subjects answered two questions that were identical to the above except that the labels were different. One question included the entire mandated alcohol warning labels and the other includes a "causes cancer" label. Of the 89 students, 72 selected the blank label more often than the 'poison' or 'toxic' label. Of the 22 subjects who were given the "causes cancer" label- 11 selected the blank label and none selected the "causses cancer" label. Of the 22 subjects who were given the government warning label- 19 said they were indifferent and that it would not matter which can

they would select (However, this was a small sample thereby reducing the statistical power).

A second study was conducted to replicate the above key areas of investigation, with an additional 75 undergraduate students also enrolled in the introductory psychology course at Arizona State University. Results indicated that students were more likely to choose a beer can that did not have any warning label.

There were a number of limitations with the study. For example, there was no breakdown of the sample in terms of gender, age, prior exposure to warning labels, and drinking history was only briefly described for subjects in Study 2. Drinking history and beverage choice may have affected individual's choices in relation to the decision matrix they were faced with- as this was not controlled for it could confound results. No information was provided as to when the research took place- it was therefore possible that students in study two were aware of the results and aims of Study 1.

MacKinnon, Pentz and Stacy (1993) surveyed 1,211, 12th grade students in September (n=934) and October (n=277) 1989 and 2006, 12 grade students during October (n=1,160), November (n=698), December 1990 (n=79) and February 1991 (n=69). The purpose of the study was to determine awareness of the alcohol labelling law, beliefs about and memory for the risks on the labels. Results indicated that exposure to the warning label increased from 26% in 1989 to 41% in 1990.

In 1990, the average recognition memory score was 4.3 (SD=1.24) correct items, which was statistically significant ($p < 0.01$) increase over the average of 3.6 (SD = 1.26) correct items in 1989. Results also suggested that higher levels of alcohol use were associated with increased awareness of the legislation and exposure to and memory of the alcohol warning label. However, consumption was based upon self-report which may be unreliable among school based adolescents who are under the legal drinking age, potentially limiting the reliability of the results. As the latter surveys were conducted over a five period within Marion County it is also possible that potential reporting bias may have occurred.

MacKinnon and Fenaughty (1993) investigated whether higher reported alcohol consumption of 243 U.S. college participants was associated with an increased ability to recall the content of the warning messages. Results found a significant correlation between alcohol consumption and the ability to identify the warning message on a label when presented with the various options, suggesting more exposure to the warning label can have an impact on the ability to process and recall the content of the message.

Limitations of the study were that alcohol consumption was self-reported and may be unreliable (Johnston and O'Malley 1985), the participants were college students and results may not generalise to other groups within the population. Participants were also given the warning messages and asked to circle which ones they recalled seeing. Requesting participants to recall contents of the warning label messages, without prompting, may be a better indicator of the participants' ability to recall the content of the message.

MacKinnon and Lappin (1998) investigated whether providing a warning on an alcohol advertisement may be perceived as having more benefits when compared to a product with no warnings present. In two U.S. studies, the first of which involved 164 undergraduate university students and the second 268 undergraduate university students, non-drinkers perceived greater risks associated with alcohol than drinkers and were also more likely to indicate they would avoid alcohol in the future to minimise alcohol-related harm. The inclusion of warnings had no significant effect on intentions regarding future consumption. The results did not support the notion that inclusion of warning labels can be counterproductive (referred to as the boomerang effect such that drinkers perceive alcohol as having more benefits when the warning is present).

Nohre, MacKinnon, Stacy and Pentz (1999) analysed results from 6,391 12th grade students in the state of Indiana (U.S.). In 1989, prior to the appearance of alcohol warning labels, 1,211 participants were interviewed. After the warnings appeared, 2,006 and 3,174 students were interviewed in 1990/1991 and in 1991/1992 respectively. The study was designed to measure the effect of receiver characteristics on alcohol warning labels. Awareness of the warning label and the legislation of

providing warning labels on alcoholic beverages were found to be higher among participants from lower SES, those who had lower grades, those who drank more alcohol and may have therefore been exposed to more alcohol warning messages. More exposure to the warning messages was also found among those participants who drank directly from the container (e.g. bottle or can) as opposed to those drinking from glasses. Students who drank from the container had more accurate memory for the risks on the warning than students who poured the beverage into a glass. However, drinking directly from the alcohol container was unrelated to awareness of the alcohol labelling law and beliefs about the risks on the label. Limitations of this study were that there was no control group, no validation of self-reported behaviour and the students represented a homogenous sample, being from one county area, thus reducing the external validity of the results.

MacKinnon, Nohre, Pentz and Stacy (2000) conducted cross-sectional surveys of 16,661 grade 10 and 15,856 grade 12 students during each school year from 1989/90 to 1995/95 in Marion County, Indiana. Students were asked whether or not they had seen warning labels on alcohol beverage cans or bottles. For both grades, there was significant pre-post effect of the warning label on awareness. In an attempt to control for response bias, students were also asked about changes in cigarette labelling requirements. There was no overall change in awareness of the cigarette labelling law in either school cohort. For both grades the pre-post effect of the warning on alcohol use in the previous month was not significant as was the linear trend. For both grades the pre/post effect of the warning on driving after drinking during the previous month was non-significant. This research had a large sample size and involved most high schools in Marion County. However, as there was no control site, a number of extraneous variables may have influenced the results. While the results may be generalisable to Marion County, the reader was not informed as to how residents in this local area compare to other state or national populations, but the authors did indicate that 52% of the sample reported their father's job as executive, business owner, professional or high-end salesperson indicating a relatively high Socio-Economic-Status.

MacKinnon, Nohre, Cheong, Stacy and Pentz (2001) conducted longitudinal surveys with 649 Marion County students during the 1989/90, 1990/91 and 1991/92 school

years to investigate the occurrence of an exposure effect, a deterrent effect, and a harmful effect (a positive relationship between early exposure and subsequent consumption and both exposure and deterrent effects operating at the same time). Results indicated the presence of an exposure effect. Cross-lagged correlations between the constructs of alcohol use and warning exposure indicated that earlier exposure to the alcohol warning did not significantly reduce alcohol consumption, suggesting that the warning had no deterrent effect. Nor was there any evidence that exposure lead to an increase in consumption, indicating no harmful effect of the warning. The authors concluded that the results of their study support the conclusion that alcohol warning labels do not reduce alcohol-related risk behaviours, but that

“there is evidence that the warning is informing the public about the possible consequences of alcohol consumption”. (p. 226).

Summary

MacKinnon and colleagues found a significant correlation between alcohol consumption and the ability to identify the warning message on a label. The authors also reported that students who drank from the container had more accurate memory for the risks on the warning than students who poured the beverage into a glass. However, drinking directly from the alcohol container was unrelated to awareness of the alcohol labelling law and beliefs about the risks on the label. MacKinnon also found that whether or not a container included a warning message was not predictive of intentions regarding future consumption. Finally, Mackinnon and colleagues reported that while exposure to an alcohol warning message did not reduce consumption, nor did it appear to lead to an increase in consumption. As previously discussed there are a number of limitations that reduce the generalisability of the research by MacKinnon and colleagues. The primary limitation was that the various samples were all from one county in continental U.S. As no information was provided to indicate how representative this sample was of other young people across the U.S. this limits the interpretation and generalisability results. There were also no matched controls making it difficult to separate the impact of warning labels from other influences.

5. Mazis et al – 1991 to 1996

To measure the impact of the alcohol warning label on consumers in the U.S., Mazis, Morris and Swasy (1991) conducted independent cross sectional telephone interviews with a national sample of 1,008 adults in May 1989 and 1,020 adults in May 1990 (pre- and post-introduction of mandatory labelling). Participants were asked questions to measure perception of the risks associated with alcohol and awareness of the alcohol beverage warning message. Those respondents who indicated that alcohol beverages were very or somewhat likely to contain warning labels were asked what information was contained in the label, and asked to identify what if any potential hazards they associated with drinking alcohol. Data were also collected on demographic information and the participant's alcohol use.

Over the 12-month period between interviews, there was no statistically significant shift in respondents' perception of the risks associated with alcohol (49.8% rated alcohol as very harmful in 1989 and 54.1% rated alcohol as very harmful in 1990). However when results were analysed by age, younger respondents (18-29 years) showed a greater increase from 1989 (47.1%) to 1990 (55.5%) in the proportion rating alcohol as very harmful.

In May 1989, 23.3% of respondents indicated that it was likely or very likely that alcoholic beverage containers included warning labels. By May 1990 this figure had increased significantly to 35.1%. There was also a significant age by year interaction, with label awareness increasing from 21.4% (1989) to 43.1% (1990) amongst the youngest age group. Interestingly, heavier drinkers (defined as consuming five or more drinks per two-week period) showed a significantly greater change in reported label awareness than lighter drinkers and the proportion of them describing alcohol as very harmful increased from 21% (1989) to 30% (1990). One limitation of the research by Mazis et al (1991) was that there was no control site for comparison. While more difficult, it would have been useful for the research to have been longitudinal rather than cross sectional as this may have allowed for better inference of cause and effect. While it was beyond the scope of the paper, investigation of impact on behaviour change would have been beneficial considering the relatively large sample size.

Mazis et al- 1996

In a follow up study Mazis, Morris and Swasy (1996) reported on the results of a 5 year study which involved cross sectional surveys conducted from May 1989 to 1993. In excess of 1,000 respondents were interviewed each year from across the continental United States using a proportionate stratified sampling design and random-digit dialing. There was a statistically significant change in reported awareness of the alcoholic beverage warning label over the five year period (χ^2 271.65, $df=4$, $p<0.0001$). In 1990, 35 % of the sample indicated that it was likely that alcohol contained a warning label. This increased to 55.0% in 1993. Similarly, there was an increase in recall of the alcohol and pregnancy message over time, with 12.0% indicating recall of the message in 1990 and over 26% doing so in 1993. The percentages reporting recall of the alcohol and driving message were smaller with 4.8% indicating recall of the message in 1990 and 7.7% indicating recall of the message in 1993.

One limitation of the research was there was no matched control site. A major weakness was the response rate, which was less than 50%, indicating the potential for selection bias.

6. Marin et al – 1997

Marin and Gamba (1997) conducted a longitudinal telephone survey with 777 Hispanics and 234 non-Hispanic participants residing in San Francisco, in 1991 and 1992. Both groups of participants showed an increase in awareness of alcohol warning labels from 1991 to 1992 on beer and wine containers. Amongst Hispanic people, awareness of the health warnings on beer bottles increased significantly from 29.0% to 33.0%, while among non-Hispanic people awareness rose from 29.4% to 44.7%. However, as there were limited controls applied to the research, either in design or analysis, and because the warning messages had been used in other education campaigns, it is not possible to isolate the specific impact of the specific labels.

In a separate study, Marin (1997) conducted a cross-sectional telephone survey with 4,661 randomly selected Hispanics aged between 21 and 65 years between 1989 and 1992. By 1992, 96.4% of the sample indicated that they were aware of the alcohol and pregnancy message, while 81.3% were aware of the alcohol and driving message. According to Marin, this represented a statistically significant effect for year of survey. Older respondents were more likely to report awareness of both of the above warning messages than younger respondents. However, Marin did not define what age groups these represented.

In addition, the value of the study is limited by the fact that no detail was included in the paper on the response/consent rate or how representative the sample was of the general Hispanic community, and the four cohorts appeared to differ on a number of demographic variables (e.g. length of time in U.S.; mean annual income).

6.2 Papers from individual studies

1. Scammon et al – 1991

In a study conducted in Utah, which has one of the lowest rates of alcohol consumption in the U.S. and a significant Mormon population, Scammon, Mayer and Smith (1991) analysed data collected from a total of 2,417 participants (no breakdown was provided of the specific numbers interviewed pre- and post- the implementation of warning labels). Participants were categorised as devout or non-Mormons. The study found that 34.9% of non-Mormons and 11.1% of devout Mormons² were aware of the alcohol labels in 1990. There was no evidence that consumers' perceptions of alcohol-related risks increased over time. On the contrary, the percentage of birth defects attributable to alcohol declined between the study periods (from an average of 29.3% pre-warning to an average of 26.0% post-warning). As the research had no control intervention and the subjects were not representative of the adult U.S. population they cannot be generalised beyond Utah.

² Devout Mormons are unlikely to drink alcohol as the consumption of alcohol may violate Mormon doctrine as described in the Word of Wisdom (<http://www.utlm.org>)

2. Snyder and Blood- 1992

To investigate whether or not subjects would perceive an alcohol product as less beneficial and of greater risk when it is presented with a warning Snyder and Blood (1992) recruited 159 communication science undergraduate students from the University of Connecticut in 1990.

Subjects (approximately 40) were assigned to each of one of four conditions. Subjects were told that they would be shown slides of products to evaluate. Subjects then viewed six slides of different alcohol products (two beers, two liqueurs, two spirits). In the first condition, the six slides each depicted a bottle against a neutral background. The second condition used slides against a neutral background that included the warning message at the bottom of each slide. The third condition depicted each bottle in a magazine advertisement. In the fourth condition, the warning was added to the bottom of the advertisement. After viewing each slide for 15 seconds, subjects evaluated the risk and benefits of each product using the same series of 7-point semantic differential items. Results indicated that the warnings had no effect on the students' ratings of product risk, and mixed effects on benefits. For non-drinkers, their estimates of the benefits were lower when they were exposed to the warnings, but this was not statistically significant. For drinkers, the warnings "boomeranged" (sic) causing drinkers to rate the alcohol product as more beneficial. In addition, the warnings caused the male drinkers to have greater drinking intentions ($F(1,61) = 4.99, p = 0.03, r^2 = 0.07$).

This research does have a number of limitations. The sample size was small and non-representative reducing the generalisability of the results. In addition, subjects who reported that they did not see the warning, all those aged over 22 and male non-drinkers were excluded from the analysis. The resulting confounding between gender and drinking status precluded using gender as a variable in the analyses. In addition, the research was conducted in April and then again in October of the same year, again with university students from the same course. It was therefore possible that the second wave of students were aware of the study design and purpose. This could potentially bias data. Finally, the authors did not include the means and the statistical test of the contrasts for the cited "boomerang effect".

3. Malouff et al – 1993

Malouff, Schutte, Wiener, Brancazio and Fish (1993) used four small independent studies to analyse the noticeability of warning labels on alcohol beverage containers and investigated what design elements might increase the conspicuousness of the labels. In the first study, 43 college students (no information was included on how the subjects were recruited into the research) were each provided with one of 11 randomly selected beer cans or bottles. Subjects were then asked how prominent or conspicuous they felt the warning was. Thirty-three (77%) of subjects indicated that in their opinion the warning was not prominent.

In the second study, with 50 college students who rated how conspicuous vertical versus horizontal labels were, 66% (n=33) indicated that the horizontal labels were more conspicuous and noticeable. However, as the labels were only applied to beer bottles, the sample was small and comprised of mainly females (74%, n=37) the results cannot be generalised to other beverages or populations.

The results were supported by another small study where 21 college students were presented with beer containers that included a horizontal warning and 23 students were presented with beer containers that included a vertical warning. Results indicated that 38% (n=8) of students in the horizontal condition were aware of the warning, whereas only one of the other 23 students in the vertical condition were aware of the warning. It is also important to note that these were relatively small samples, limiting interpretation and generalisability of results.

Finally, in the fourth study, with 75 patrons in a bar, the authors attempted to investigate whether or not those patrons who recalled the message drank less. While the authors did make this conclusion, there were significant limitations. Firstly, the number of drinks was not determined by self-report but rather by the researchers obtaining copies of patron's bills from the bar staff, as not all patrons may have purchased their own beverages, i.e may have been involved in "rounds or shouts" this methodology may have reduced the validity of results. In addition, as the subjects were apparently not informed they were part of a research project nor gave permission

to the researchers to access their bar bills, there are some ethical concerns with the research.

4. Parsons et al 1994

A cross-sectional study by Parsons, Johnson and Barrett (1994) analysed results from a random sample (n=481) of homeless persons interviewed in shelters, soup kitchens, drop in centers and single room occupancy hotels in Illinois, U.S. during October and November 1990. Overall, 41% of the sample indicated that they were aware of the warning labels. Of these, 21% could not recall any of the labels messages, while 43% cited one of the two messages on the label. Those aged 18-29 and those who scored 2 or more on an adapted version of the Shortened Michigan Alcohol Screening Instrument (SMAST³) were significantly aware of warning labels appearing on alcoholic beverage containers. However, of those aware of the warning labels, there was no significant difference amongst the sample in relation to knowledge of the content of the warning label message.

Because of the sample used, these results have very limited generalisability. In addition, the authors do not explain in detail how the SMAST was adapted for the purpose of the research reducing the internal validity of the research and making it difficult to ascertain the significance of the scoring system used.

5. Parker et al 1994

A cross sectional study by Parker, Saltz and Hennessy (1994) analysed results from a telephone survey of 913 adults in 1989 and 1,542 adults from 1991 to 1992 in California, U.S. to study occasions of drinking and driving and of self-reported alcohol-impaired driving. The results found that those at-risk of drinking and driving were also more likely to have seen and be able to recall the messages on warning labels, however they could find no evidence that people changed their drinking behaviour as a result of seeing the warning label on alcohol beverage containers. However, as some of the pre-test interviews were conducted after health warnings

³ Selzer, Vinokur and van Rooijen (1975). SMAST is a 13 item questionnaire in which each affirmative answer is given a score of 1.

commenced appearing on alcoholic beverages, there is some doubt about the validity of the results. In addition, no information was provided as to how representative the sample was of the general population, making it impossible to conclude how generalisable the findings were.

6. Gorn et al 1996

Gorn, Lavack, Pollack and Weinberg (1996) had 55 Canadian university students create drink driving warning messages for beer bottles. Half the subjects were required to develop one message that was aimed at female students and the remainder were asked to develop a message aimed at male students. The effectiveness of these labels and current U.S. warnings was determined by four raters (two female and two male university students). Effectiveness was measured on three dimensions. These dimensions were 'likely/not likely to make a person pause before drinking and driving that evening', 'like/dislike the label' and 'likely/not likely to be an effective label'. A further six dimensions were used to measure other impacts of warning labels. Results suggested that the warning labels created by the students were rated as being more effective when compared to the U.S. government mandated labels. The authors concluded that it is possible to create more effective labels to target subgroups of the population than the current government mandated warnings.

Unfortunately, whether or not raters had seen U.S. warning labels was not assessed. Subsequently, the conclusions made by the authors, that raters would not have been aware of the U.S. warning labels and subsequently not influenced to rate designs generated by their peers as more effective, cannot be validated. In addition, no information was included on the average age of students or whether they had ever consumed alcohol. Finally, as the research involved a relatively small sample comprised of undergraduate consumer behaviour students who were not necessarily representative of the wider university population, it is difficult to generalise results to other populations.

7. Weiss – 1997

In 1996, Weiss conducted a study in Israel that was to represent pre-intervention data before any legislation was passed implementing alcohol warning labels. Of the 1,692 respondents, 1,505 (88.9%) supported warning labels on alcohol beverage containers, 74.4% of respondents were aware of the risks of consuming alcohol and operating machinery, 54.6% were aware of the links between alcohol and cancer and 60.4% were aware that drinking increased the risk of high blood pressure. No follow up research was located.

8. DeCarlo et al- 1997

DeCarlo, Parrott, Rody and Winsor (1997) interviewed 111 undergraduate college students and 39 adults (over the age of 30 years) about their perception of the effectiveness of several alcohol warnings (no detail was provided on the precise number of warnings each subject was asked to assess). Fifty- nine percent of the respondents reported that they read warning labels on products before buying them and 59% reported that they were aware of the warning labels on alcohol containers. In addition, 56% reported that they find warning labels to be informative and 36% viewed warning labels as the best method of informing the general public about dangers associated with alcohol consumption. There was no statistically significant relationship between the amount of alcohol consumed and perceptions of alcohol warning effectiveness.

The research has a number of limitations. As no detail was provided on the courses that the students were studying or how representative they were of the student population, this reduces the generalisability of the results. This limitation was further compounded by the inclusion of the adult convenience sample recruited from a council meeting and via personal solicitation. The only gender information that was provided was for the entire sample, and not for each group; no information was provided as to whether all respondents drank alcohol or whether some were non-drinkers; and assessment of alcohol consumption was based upon self-reported average consumption per week rather than the use of a psychometrically valid assessment tool.

9. Creyer et al – 2002

Creyer, Kozup and Burton (2002) examined responses from 168 U.S. university students and 106 Australian university students on how two different alcohol beverage health warnings placed on a fictitious brand of beer would influence alcohol-related perceptions. One warning was the current U.S. warning and the second warning stated:

“GOVERNMENT WARNING: THIS PRODUCT CONTAINS ALCOHOL. ALCOHOL IS A DRUG.”

Students were asked five questions to measure perceptions of the social benefits of drinking beer and three questions to measure perceptions of the health benefits of drinking beer. Next measures of perceived risk associated with drinking beer were assessed and finally, students were asked to rate several hypothetical drinking behaviours. Results indicated that the warning type had no significant effect on perception of the social or health benefits of alcohol, but did affect perceptions of risk and drinking behaviours. For example, the ALCOHOL IS A DRUG warning led to greater perceptions of the risk of drinking when pregnant and risk of a driving under the influence legal charge, in both countries. In addition, for binge drinkers, use of the standard U.S. warning resulted in lower risk perception than the ALCOHOL IS A DRUG warning in both countries. Considering the risks associated with binge drinking and trauma, these results are interesting and significant. The study was one of the few evaluations in which a control site was included. However, as the sample size was relatively small, only focussed on consumption of beer and only included undergraduate university students (no information was provided on which disciplines students were studying) it is difficult to generalise results to a wider population.

10. Blume and Resor – 2007

Blume and Resor (2007) conducted face-to-face interviews with a convenience sample of 99 Mexican American women to investigate their awareness of warning labels on alcohol beverage containers and the risks of drinking during pregnancy. Not surprisingly, the authors conclude that English language skills significantly predicted

participants' ability to remember health warnings on beverage containers. As the sample was small, and very little information was included on the demographic characteristics of the sample, and no indication was given of the response rate amongst participants, caution is required in interpretation and it is difficult to generalise results. In addition, the authors reported that 23 of the women were born in Mexico, but no information was provided on how long these women had been resident in the U.S. It is therefore possible that not only language but length of time spent exposed to alcohol warning labels may have variously influenced results.

6.3 A brief examination of review papers on the effectiveness of alcohol labelling

Over the past fifteen years in excess of forty review papers have been published on the effectiveness of alcohol warning labels (see Appendix 4). Only the most recent of these, (Stockwell 2006; Anderson (DHS) 2008; Wilkinson and Room 2008a; 2008b) have included the majority of available research.

Similar conclusions were reached by the majority of reviews, although of course variations occurred as new evidence emerged. The more recent reviews have reached similar conclusions to those reached in the current report: that the evidence regarding alcohol warning labels is limited and does not allow bold conclusions about impact. The recent reviews, (Anderson (DHS) 2008; Stockwell 2006; Wilkinson and Room 2008a; 2008b) concluded that there was little evidence that indicated that alcohol warning labels changed behaviour. Stockwell (2006) neither explicitly rejected nor argued strongly for the introduction of alcohol warning labels. Instead, he concluded that:

“It is likely, therefore, that a high proportion of the population may benefit from being reminded of the health and safety risks of alcohol consumption.”
(p.8).

Wilkinson and Room (2008a; 2008b) and Anderson (DHS, 2008) separately agreed that as part of a multifaceted comprehensive strategy warning labels were warranted. For example, Wilkinson and Room concluded that:

“...adding warning labels to alcohol containers has a longer term social utility in helping to establish social understanding that alcohol is a special and hazardous commodity.” (Wilkinson and Room 2008a, p.19).

Chapter 7: Summary of literature on effectiveness of alcohol warning labels

To summarise all of the aforementioned research, this chapter will critique the body of available literature against those criteria described by Argo and Main (2004). These criteria for assessing the effectiveness of warning labels are:

1. **Attention** (whether or not a consumer is aware of the presence of the warning);
2. **Reading and comprehension** (after a consumer notices a warning do they read and understand its content);
3. **Recall** (whether or not a consumer can remember the information included in the warning);
4. **Judgements** (does the message impact on a consumer's beliefs); and
5. **Behavioural compliance** (whether or not a consumer will refrain from unsafe behaviour or engage in safe behaviour).

Attention

Despite concerns that the warning labels used in the U.S. are not very noticeable (Laughery, Young, Vaubel and Brelsford 1993), there is a reasonable body of evidence to suggest that people are able to recall their presence. For example, evidence from Kaskutas and Greenfield (1992) indicated that within six months of the introduction of warning labels in the U.S., over 20% of respondents reported having seen the label. When assessed across age categories, approximately one third of those aged 18-29 years of age had seen the label, about a quarter of those aged 30-39, a fifth of those aged 40-59 and approximately a tenth of those aged 60 years and older. With regard to drinking categories, 39% of heavy drinkers and about a quarter of other drinkers and a tenth of abstainers also reported seeing the warning message on alcohol beverage containers. By 1994, the proportion of respondents who indicated that they had seen a warning label had increased to over 51% (Greenfield and Kaskutas 1998).

Reading and comprehension

None of the reviewed research papers on alcohol warning labels examined whether or not respondents were able to understand the information included in the warning message. However, research by Blume and Resor (2007) with a sample of Mexican American women, did indicate that English language skills was a significant predictor of participants ability to remember the warning messages. In addition, research from the tobacco field suggests that no matter how clear and simple the written message is, pictorial messages are superior (Hammond et al 2007). Research from the United States has found that written warnings on cigarette packaging may require college-level education to understand (Malouff et al 1992). This significantly reduces their usefulness with young people, less educated people, and people with poorer reading skills. International evidence suggests that there exist fewer differences in health knowledge across educational levels in those countries with pictorial tobacco health warnings than those countries with text only (Siahpush et al 2006). While research is required that assesses the reading level required to comprehend existing alcohol warnings, the experience from the tobacco field does suggest that this will be an important factor in explaining impact.

Recall

Research by Greenfield and Kaskutas (1998) indicated that 57.6% of 18-20 year olds who reported that they had seen an alcohol warning label could recall the drink driving message, this figure was 40.4% for 21-29 year olds, 32.4% for 30-40 year olds and 16.4% for those over 40 years of age. Similarly, of those who reported having seen a warning label, 70.4% of people aged 18-20 reported that they could recall the pregnancy message, this figure fell to 69.9% for those aged 21-29, and 63.6% for those aged 30-40 and 32.8% for those over 40 years of age. Research by a number of other authors (Graves 1993; Hankin et al 1998) also indicated that a significant proportion of people who had seen a warning label could recall the warning message. This was particularly the case with the alcohol and pregnancy message. For example, in his research with women in Detroit, Hankin et al (1998) reported that 77% of women who had seen a warning label knew that it mentioned birth defects. Additionally, when compared to those who said they had not seen any warning label,

poster or advertisement about the risk of alcohol during pregnancy, those reporting a single exposure to any warning message/source were twice as likely to say they had a conversation about drinking during pregnancy.

Greenfield, Graves and Kaskutas (1999) described some evidence that supported the conclusion that warning labels were having a real impact on recall of messages. Comparing the U.S. (where there were mandated warning labels) with Canada (where there was no such mandate) indicated that in 1990, 30% of the U.S. respondents reported seeing warning labels on alcohol beverages, increasing to 43% of respondents in 1994. This compared to 16% of Canadian participants in 1990 decreasing to 12% in 1994.

Of course, one implicit threat to these studies is that demand characteristics may encourage respondents to affirm that they had seen messages, when in fact they had not. Greenfield and colleagues (1999) explored this possibility. Respondents were asked about exposure to five warning statements. Three of these were actually included in U.S. warning labels: birth defects; drinking and driving; operating machinery. Two were not included in the warning labels, which respectively focussed on cancer and arthritis. Respondents were asked to indicate which messages they recalled seeing on the alcohol warning labels. For the U.S., over four years of study, results were fairly consistent each year with approximately 80% of participants reporting that the warning labels mentioned birth defects, about 46% mentioned drinking and driving and about 56% mentioned operating machinery. For the two incorrect messages, approximately 17% of U.S. participants incorrectly reported that the warning labels mentioned cancer and about 3 % reported that the labels mentioned arthritis. In comparison, about 42% of Canadian participants reported that the warning labels mentioned birth defects, 65% reported drinking and driving and 42% reported operating machinery. The results suggested that there is some confidence in the initial findings about recall, with a small proportion of “false positives.”

Judgements

Research on the impact of warning messages on judgements is equivocal. For example, in research by Mazis et al (1991), 50% of the 1,020 adults who were

interviewed described alcoholic beverages as very harmful in 1989. This increased to 54% of the sample in 1990. Among heavy drinkers (those consuming more than 5 or more drinks per 2 week period) 21% described alcoholic beverages as “very harmful” in 1989, with the figure increasing to 30% in 1990.

Conversely, Creyer and colleagues (2002) examined responses from 168 U.S. university students and 106 Australian university students on how two different alcohol beverage health warnings placed on a fictitious brand of beer would influence perceptions of alcohol-related risk. Significantly less risk was associated with drink driving among those respondents who had been identified as engaging in heavy episodic drinking. In particular, although warning labels advising on the risks of drinking and driving have been on U.S. alcohol beverages for over a decade, U.S. heavy drinkers perceived less risk from such alcohol-related harm when compared to Australian participants and those who were not identified as heavy episodic drinkers. Of course, interpretation of these findings is problematic, because there was no control of other factors. For example, drink driving countermeasures vary between the countries and these may have a significant bearing on the findings. A consistent problem with the available research has been the inability to disaggregate the effects of other strategies from warning label impact.

Behavioural compliance

It is on this criteria that the evidence base is very limited. There is some evidence that the introduction of alcohol warning labels lead to a reported increase in the likelihood of respondents having a conversation about the risks of alcohol (Kaskutas and Greenfield 1992), prompted pregnant women to discuss the topic (Kaskutas et al 1998) and that the greater number of warning types that respondents were exposed to the more likely they were to discuss alcohol associated risks (Kaskutas and Graves, 1994). However, there was very limited support for other behavioural change.

One of the early studies by Kaskutas and Greenfield (1992) reported some evidence of the impact of warning labels on behaviour. From the introduction of the U.S. warning labels until 1990, no statistically significant changes in behaviour were found, other than a small (3%) increase in the number of respondents reporting they had used machinery after drinking. When analyses were conducted to assess the

behavioural differences that might be associated with seeing the label, significantly more respondents who had probably seen the label reported that:

- They had driven when they would have been in trouble if stopped by the police (22% versus 10% who did not see the label);
- Limited their drinking because of driving (73% versus 56%); and,
- Had conversations about drunk driving (74% versus 65%).

In research comparing data from 1989 until 1994, Greenfield and Kaskutas (1998) concluded that, with the exception of data from 1993, those drinkers who recalled seeing the warning message about drinking and driving were significantly less likely to report driving after drinking than those who could not recall seeing the message.

The research by Kaskutas and Graves (1994) is also noteworthy as it highlighted the cumulative effect that multiple message sources may have on behaviour change. This data indicated that while exposure to one message source (no distinction was made between the efficacy of different sources) did not result in any significant behaviour change, exposure to two and three different message sources (warning label, poster, advertisement) did lead to a significant reduction in alcohol consumption due to health concerns. Amongst women aged 18 to 40 it was only amongst those seeing all three message types that a reduction in consumption was observed (odds ratio=2.8). That is, single message sources had no significant impact on behaviour but exposure to two or more message sources was associated with a reduction in adult alcohol consumption.

In a continuation of the series of quality research by Greenfield and colleagues, one study (Greenfield et al 1999) indicated that participants who had read a warning message about drink driving on an alcoholic beverage were more likely to engage in a discussion about that topic than those who had not seen the warning label. Overall, exposure to the warning label on alcohol beverages by U.S. and Canadian respondents was linked to increased discussions about alcohol and its impact on driving (and pregnancy). These results suggested that awareness of labels may generate discussions of the risks associated with alcohol consumption, but the nature of the study design does not allow a conclusion that there is a direct causal link.

Parker and colleagues (1994) analysed results from a telephone survey of 913 adults in 1989 and 1,542 adults from 1991 to 1992 in California (U.S.). The researchers were examining occasions of drinking and driving and self-reported alcohol-impaired driving among over-18's. The researchers reported that those at-risk of drinking and driving were also more likely to have seen and be able to recall the messages on warning labels. There was no evidence however that, as a consequence of seeing the alcohol warning label, people changed their drinking behaviour.

Finally, based upon longitudinal research with 649 University students MacKinnon, et al (2001) concluded that while exposure to the alcohol warning did not significantly reduce alcohol consumption, nor was there any evidence that exposure lead to an increase in consumption; therefore indicating no harmful effect of the warning.

Conversely, research by Hankin et al (1993) did demonstrate behaviour change in which exposure to the warning message lead to a reduction in alcohol consumption amongst pregnant women who were light drinkers, and pregnant for the first time (Hankin et al, 1996). Additionally, after examining data from 1990 to 1994, Greenfield et al (1999) reported that across all years, controlling for age, gender, education and alcohol consumption, people who had seen the warning label were more likely to drive after drinking too much, but also to say they had deliberately not driven after drinking during the past year.

Finally, the latest research by Tam and Greenfield (2008) is also significant as it suggested that those individuals who could recall a drink driving message were more likely to intervene to deter someone else from drink driving. This research was unique in the body of published literature for specifically investigating the impact of warning labels on third parties and for addressing the issue of social norms. More research is warranted on the topic particularly as it links to models such as the Health Belief Model and social learning theory

Summary

In summary, the majority of research that has assessed the impact of alcohol warning labels indicates that the approach has had a limited impact on drinking and risk

behaviour. That the majority of observed effects have been modest should however not be surprising considering that the follow up in most research has been short term (6 months or less). As argued by Kaskutas and Greenfield (1992) and Graves (1993) such a brief period of time may not be sufficient for individuals to act on the information contained in the label. Additionally, if the key criterion for success of warning labels is about shifting the cultural place of alcohol in a society, then short term evaluations will inevitably be insufficient and disappoint (Wilkinson and Room 2008a). On the other hand, models of health communication suggest that we should expect that (well designed) health communication will be noticed and will inform individuals of risk – which is a legitimate goal in itself. The same models, and available research, indicate that we would less likely detect changes in behaviour, unless warning labels are coupled with other approaches.

A major problem in advancing theory, and in reaching definitive conclusions about impact is, as indicated throughout the discussion, that there are major limitations in the existing research, and research gaps, and it is to these we now turn.

7.1 Limitations and gaps in the existing research

As previously mentioned, despite the fact that over twenty countries have now implemented legislation that requires that all imported and domestically produced alcohol is to include a warning label, limited research has assessed the impact of this strategy. Of the research that has been conducted, researchers from the U.S. have dominated outputs. Apart from a few well designed and controlled studies, much of the effort has been constrained by relatively small samples with non-representative populations. Amongst those studies that have been well designed, most have relied on self-report with no confirmation of the reliability and validity of these measures.

These limitations have significant implications on the internal and external validity of the research and restrict the generalisability of findings. More international research is required to determine how the U.S. studies are applicable to other nations. More research that includes adequate control, in design and analysis, is also required so that the impact of warning labels can be assessed with some confidence, independent of other potentially confounding extraneous variables. In those countries that may be

considering the introduction of alcohol warning labels, comprehensive baseline and post intervention data are required. As research to date has relied on self-report, it is also important that future research includes reliable and valid measures of alcohol consumption and alcohol sales data and data on alcohol related risk behaviours. Such research would also require the sophistication to adequately control for or account for the impact of other factors such as price fluctuations, advertising and other promotion controls, policy changes and other preventive activity.

At present it is not possible to compare the impact of voluntary and mandated alcohol warning labels, but most countries that have adopted warning labels have mandated such developments, an approach consistent with public health responses to tobacco. The lesson from the tobacco field is that there was significant tension between public health advocates, government and industry surrounding the introduction of tobacco warnings (see Scollo and Winstanley 2008; Chapman and Carter 2003). It is likely that such tensions will emerge in any consideration of alcohol warning labels, especially in the light of the current status of the evidence base.

Unfortunately, no research was identified that examined what potential effects alcohol warning labels may have on beverage preferences and substitution effects with other drugs; nor how alcohol warning labels may have impact in hotels, nightclubs and other licensed premises where bottled alcohol might not be served, or does not form a significant part of sales. The only identified relevant research was by Nohre et al (1999) who reported that whether students regularly drank from an alcohol container (hence more exposure to the warning) as opposed to those who poured the beverage into a glass, was unrelated to awareness of the alcohol labelling law and beliefs about the risk on the label. Students who did drink from the alcohol container had more accurate memory for the risks on the warning. This research highlights the need for further investigation of how method of consumption may mediate the influence and impact of warning labels. There has been research from the tobacco field that indicates that avoidance of warnings may not necessarily be a negative outcome but may be predictive of making an attempt to quit (Borland et al as cited by Scollo, 2008).

While research by Snyder and Blood (1992) indicated the possibility that warning labels may have some negative consequences, later research by MacKinnon and Lapin (1998) and MacKinnon et al, (2001) did not find any evidence of a potential “boomerang” or harmful effect after exposure to an alcohol warning label. Nonetheless, the issue of unintended adverse outcomes has not been well investigated. Recent American research by Buie, Burton, Howlett and Kozup (2008) with a sample of 230 university students indicated that including serving facts information (calorie, nutrient and alcohol content) on alcohol beverage containers significantly decreased calorie and carbohydrate evaluations of wine and increased consumption intentions and for distilled spirits, it reduced perceived fat and carbohydrate levels and also increased future consumption intentions. Results of this study are indicative of the need for further consideration of the issue of potential unintended consequences.

7.2 Conclusion

Much of the community and Governments’ concern about alcohol related problems is directed currently at the short-term, acute effects, especially among younger age groups. Contemporary policy discussion, and related initiatives, in both New Zealand and Australia include a strong focus on heavy episodic drinking, especially among younger people. Information about the short-term consequences of alcohol has been included in the information of alcohol warning labels from the U.S., with the greatest focus on drink driving and operating machinery. There has been much less attention given to other short-term consequences such as intentional and unintentional injury, alcohol overdose (or poisoning), violence, and the risks of combining alcohol with other drugs (legal and illegal) despite the fact that these are major areas of alcohol related morbidity and mortality. Similarly, there appears to be little attention given to the collateral consequences of risky drinking.

Very little evidence exists about the impact of warning labels on risks associated with the acute effects of alcohol. Most quality information comes from one U.S. research group. There is some evidence that over time continued exposure to alcohol warning labels is associated with increases in recall about the label content. There is some evidence regarding variable recall about alcohol warning labels, influenced by the

message/content and characteristics of the respondent (drinking status; age). While there appears to be general support for a range of messages included in alcohol warning labels, some messages are more acceptable and believable than others. The evidence suggests that the design and content of warning labels will need to consider aspects of the intended message, characteristics of the intended target group(s) and consideration of the needs of the target audience (e.g. current knowledge of risks).

While there is some indication of warning labels being associated with behavioural intentions and a possible increase in some precautionary behaviour, there is a need for substantial caution in interpreting these findings. First, the studies are small in number and generally rely on self-report, and there are a number of threats to the study designs. Second, the studies do not control other influences and confounders, either in design or analysis. Third, the effects are not always in a consistent direction. For example, heavy drinkers might more frequently be exposed to warning labels and more readily recall the messages, but this exposure is not necessarily associated with lower rates of risky behaviour.

In short, consistent with other reviews, we conclude that the existing evidence does not allow bold conclusions about the value of warning labels, in particular in reference to the impact on behaviour. In frustration, some public health advocates will point to the evidence about the importance and impact of tobacco warning labels and be perplexed by the lack of supporting evidence from research investigating the impact of alcohol warnings. It is relevant to note that in design, impact, prominence, and integration with broader based substantial campaigns, alcohol warning labels are more modest than tobacco warnings and this *may* be a factor in the lack of supporting evidence. It is also relevant to note that some have argued that even in the absence of strong evidence about impact, consumers have a right to be able to access quality information about risks, and providing that information in close proximity to consumption is reasonable.

It is observed that investigation of potential unintended adverse outcomes of alcohol warning labels was not a feature of many evaluations. Similarly, the costs, to governments, community and the alcohol industry that would be associated with the

implementation of alcohol warning labels have not been clearly addressed in evaluations. These are important omissions, and future endeavour should address these shortcomings.

Finally, while not identified in any detail in the relevant literature, it is important to recognise that warning labels will not always result in message exposure to all those at risk. For example, people who regularly drink in clubs, bars, restaurants and hotels may not be highly exposed to information on an alcohol container, indicating the possible need to include other strategies if alcohol warning labels are embraced as a strategy or a component of a broader harm reduction approach.

7.3 Estimates of possible changes in outcomes

One of the objectives of the review was:

To provide estimates of possible changes in outcomes which may be used to measure the effectiveness of labelling in Australia and New Zealand if advisory statements on packaged alcohol were introduced, drawing on domestic and international experience of alcoholic beverage labelling and comparable public health initiatives, within the context of the Australian National Alcohol Strategy and New Zealand National Drug Policy

As indicated, the paucity and quality of the research limits the ability to which such estimates can be made. The tobacco experience indicates that warning labels, at least for this product, can have impact, when part of a broader strategy. This latter research also indicates that particular types of warning labels are more effective than others. However, we should be cautious in assuming that this experience can simply be generalised to alcohol. There is not sufficient evidence to make such an assumption.

Nevertheless, the available evidence does allow us to make some tentative estimates. These estimates are drawn from the literature review, being based on the higher quality and more consistent research findings regarding alcohol warning labels.

If alcohol warning labels were to be introduced in New Zealand and Australia:

- Within a two- to three-year period, the majority of drinkers will have noticed the warnings;
- Younger people and heavier drinkers may be more likely to notice the warnings;
- Of those who notice the labels, approximately 50% will be able to recall the message (this will vary depending on the content of the message);
- There is likely to be an increase in the number of conversations that people will engage in on the message topics;
- It is less clear whether any behaviour change will occur. However, it is possible that:
 - People who see the labels *may* report that they have limited their drinking when driving;
 - If labels are complemented by point of sale, posters and other message sources, people *may* report a reduction in their consumption;
 - Those who can recall a drink driving message *may* intervene to deter other people from drinking and driving.

It is unclear what unintended adverse outcomes may arise. It is not possible to estimate costs or the cost-effectiveness/efficiency of the approach because such information was not provided in the research reviewed. It is important to note that these suggestions are based on evidence of the effects of U.S. warning labels, which were small text based messages that were not clearly linked (in the research reports) to other strategies.

Chapter 8: Tobacco warning labels - lessons for alcohol?

Before concluding the review of alcohol warning label research, it is worthwhile considering the impact of tobacco warning labels. It is noted that alcohol and tobacco differ in a number of respects. For example, no level of tobacco consumption is considered low risk, and the aim of public health strategies is to encourage people not to commence smoking at all or to quit if they do. This is distinguished from messages of moderation included in most countries' alcohol policies and the policies and strategies adopted in New Zealand and Australia. In the following discussion, we do not aim to equate alcohol with tobacco, nor intend to suggest it necessarily demands the same public health strategies. On the other hand, responses to tobacco have involved multifaceted public health approaches, including a substantial focus on product labels, probably more than most other products, and we explore tobacco warning labels to examine if there are any lessons worth considering in relation to alcohol.

In 1973, Australian legislation enabling a health warning to appear on cigarette packages was introduced (Australian Government Attorney Generals Department 2008). One year later, similar legislation was passed in New Zealand (Smokefree Coalition 2008). Initial tobacco labeling in Australia involved just one health message: 'Warning—Smoking is a health hazard'. In 1985, the number of health warnings increased to four and warnings also began appearing on print advertisements and billboards (Scollo and Winstanley 2008). In 1987, in New Zealand new, varied and stronger health warnings linking smoking to heart and lung disease began to appear on the front and back of cigarette packets.

In 1995, the number of health warnings in Australia increased to six (Scollo and Winstanley 2008). Legislation required that the warning label had to be printed in black on a white background, within a black border. On each pack of cigarettes, the warning message had to cover at least 25% of the area of the face on which it was printed and the explanatory message at least 33.3% (Scollo and Winstanley 2008). Warnings had to be positioned at the top edge of the pack faces (Scollo and Winstanley 2008). Research indicated that these new warnings were effective in

improving knowledge and understanding and in eliciting responses that were predictive of quitting (Borland 1997; Borland and Hill 1997).

Research commissioned by the Commonwealth Department of Health and Ageing in 2000, indicated that consumers agreed that warning labels needed to be upgraded more frequently, should be more specific and should be more prominent on packaging (Elliot and Shanahan Research 2000).

The Technical Advisory Group assisting the Australian Commonwealth recommended that new warnings should cover 50% of both front and rear pack faces. This proposal went to public comment, and was subsequently modified to cover only 30% of the front and 90% of the back. New regulations were passed in 2004 (Trade practices (Consumer product information standards)(tobacco) Regulations 2004) and applied to all tobacco products imported into or manufactured in Australia after 1 March 2006 (Scollo and Winstanley 2008). As part of these regulations, graphic images had to be shown with each warning message (Trade practices (Consumer product information standards) (tobacco) Regulations 2004, Part 3, Regulation 17).

In 2008, New Zealand also legislated for the introduction of picture-based warnings on tobacco (Ministry of Health 2008a). Prior to the introduction of graphic warnings, New Zealand had six different text warnings that featured on tobacco packages. These were: smoking causes lung cancer, smoking is addictive, smoking kills, smoking causes heart disease, smoking when pregnant harms your baby and your smoking can harm others.

In November 2006, the New Zealand government announced that by February 27 2008, all cigarettes sold in that country must have one of 14 warnings covering 90% of the back of the package and 30% of the front. Legislation dictated that the warnings must appear in both English and Maori languages. The graphic health warnings were also required on cigars. From 28 February 2008, seven graphic warnings appeared on cigarette packets in both English and te reo Māori and from March 2009 a further seven warnings will be introduced, which will then be rotated each year thereafter (Ministry of Health 2008a).

Cigarette packets in New Zealand will also display the Quitline free phone number and other information about quitting smoking. The government also revised its toxic constituent labelling for the side panel of cigarette packages (Ministry of Health 2008a).

For examples of the warning labels used in Australia and New Zealand, see Figures 16 to 19 below (Electronic access details for each figure can be found in Appendix 2).



Figure 16. Initial warning label on tobacco in Australia, 1973



Figure 17. Warning labels on Australian cigarette packages from 1994 to 2005



Figure 18. Examples of warning labels on cigarette packaging in Australia from 2006



Figure 19. Three examples of health warning labels (front and back) from New Zealand cigarette packets as at February 2008

Chapter 9: Evidence on the effectiveness of tobacco health warnings

Warning labels on tobacco products have an effect on smokers' understanding of the risks of tobacco use and on their reported consumption levels (Hammond, Fong, Borland, Cummings, McNeill and Driezen 2007). Canadian and Australian research has found that tobacco warning labels represent an important source of health information (Tandemar Research Inc 1996; Borland 1997). Research by Hammond, Fong, McNeill, Borland and Cummings 2006 using nationally representative samples of adult smokers from the U.S., the U.K., Canada and Australia indicated that cigarette packages were a prominent source of health information. For example, 84% of Canadian, 69.3% of Australian, 56.1% of UK, and 46.7% of US respondents agreed that cigarette packages were of a source of health information. Smokers have also reported that warning labels have prompted them to reduce their consumption levels, increase their likelihood of quitting, increase their motivation to quit and increase the likelihood of remaining abstinent following an attempt to quit (Hammond, McDonald, Fong and Cameron 2004a; Hammond, Fong, McDonald, Brown and Cameron 2004b; Hammond et al 2006; Hammond et al 2007; O'Hegarty, Pederson, Yenokyan, Nelson and Wortley 2007; Willemsen 2005; Hill 1988).

In the Netherlands, placement of the national Quitline number on tobacco packs with text-based warnings led to a 3.5 fold increase in the number of calls, (Willemsen, Simons and Zeeman 2002) and calls to the Quitline in Australia also increased after the introduction of improved consumer product information in 2006 (Cancer Council of Victoria 2007). As in Australia and New Zealand, laws requiring picture-based warnings on cigarette packages have now been finalised in Belgium, Brazil, Canada, Chile, India, Jordan, Singapore, Thailand, Uruguay and Venezuela (Australian Government Preventative Health Taskforce 2008). The EU directive for tobacco warning labels mandates that the general warning must cover at least 30 % of the external area of the surface of the packets (Hammond et al 2007).

9.1 Elements of effective tobacco labels

Evidence from both New Zealand, Australia and elsewhere indicates that the content, style and presentation of tobacco warnings can markedly affect how noticeable and

memorable warnings are, and also influence the extent to which consumers understand, believe and feel empowered to act upon the information they contain (Scollo and Winstanley 2008). Evidence drawn from social psychology (Strahan, White, Fong, Fabrigar, Zanna and Cameron 2002) indicates that tobacco warnings are most effective when they:

- Promote negative attitudes to smoking, while also promoting positive attitudes to quitting;
- Combine strong fear appeals with information about how risk can be avoided;
- Convey a sense of the negative social as well as negative health consequences;
- Focus on the relevant attitudes of the target groups;
- Increase perceived self-efficacy;
- Promote discussion about smoking among smokers friends and family; and,
- Confront self-exempting beliefs (Scollo and Winstanley 2008).

There is also now a considerable body of research that indicates what form and style of tobacco warning labels is the most effective. Based upon this research it is evident that:

- **Obscure text warnings appear to have little impact.** The evidence indicates that messages that depict health risks in a vivid and emotionally arousing manner, in clear simple language (Createc and Market Studies 2003) and are frequently rotated have the greatest impact (Strahan et al 2002; Witte and Allen 2000). Australian research shows that the peak levels of response to warnings is in the period immediately after their introduction (Borland and Hill 1997);
- **Pictures are more effective than text.** There is a growing body of evidence that suggest that no matter how clear and simple the written message is, pictorial messages are superior (Hammond et al 2007). Analysis of warnings on cigarette packaging in the United States indicates that comprehending the messages requires college-level education (Malouff, Gabrilowitz and Schutte 1992). This significantly reduces their usefulness with young people, less educated people, and people with poorer reading skills. International evidence suggests that there exist fewer differences in health knowledge across

educational levels in those countries with pictorial tobacco health warnings than those countries with text only (Siahpush, McNeill, Hammond and Fong 2006). In addition, picture based warnings have been rated as more effective than text only warnings as a deterrent for new smokers and as a means of increasing cessation among existing smokers (Liefeld 1999; O'Hegarty, Pederson, Nelson, Mowery, Gable and Wortley 2006);

- **The bigger the warning label the better.** Smokers are more likely to recall larger warnings, with bigger warnings associated with greater appreciation and acceptance of risk (Centre for Behavioural Research in Cancer 1992; Environics Research Group Ltd. 2005; Cragg and Dawson Ltd. 1990; Strahan et al 2002; Createc 2008). Evidence also indicates that warnings in boxed sections are more effective (AGB Spectrum Research Ltd. 1987). Research recently undertaken for the Canadian Government found that health warnings occupying 75% of the pack were more effective than warnings occupying 50% of the pack in conveying information about the health risks of smoking (Createc 2008). Research (Health Canada 2005; AGB Spectrum Research Ltd. 1987; Strahan et al 2002) has also demonstrated that not only are smokers more likely to recall larger warnings, they also equate the size of the warning with the level of risk. Research from Canada indicated that smokers judged those warnings that covered 80% of the package as most effective (Environics Research Group Ltd 1999); and,
- **Put warning labels on the front of tobacco packaging.** Evidence indicates that smokers will have better recall of warning labels that appear on the front, rather than the side of packages (Centre for Behavioural Research in Cancer 1992; Cragg and Dawson Ltd. 1990; AGB Spectrum Research Ltd. 1987; Linthwaite 1985; Environics Research Group Ltd. 1999). Illustrative of this finding was 1995 comparative research undertaken in Canada, where warnings appeared on the front of tobacco packages and the U.S. where labels appeared on the side. Results indicated that 83% of Canadian students recalled health warnings compared to 7% of U.S. students (Northrup and Pollard 1995). Additionally, research indicated that the top of the front is likely to have greater impact than the bottom of the front (Centre for Behavioural Research in Cancer 1992). Research also shows that the warnings should be on plain

backgrounds (e.g. white for black text), so they do not blend in with other information on the packaging (Borland and Hill 1997; University of Toronto 1993; Rootman and Flay 1995; Goldberg, Liefeld, Madil and Vredenburg 1999; Beede and Lawson 1992).

In summary, research in the tobacco control area highlights that for warning labels to be most effective in increasing awareness and perceptions of risk, and prompting behaviour change they need to be prominent, simple, and visually graphic. There is little doubt that the comprehensive suite of tobacco control measures in both Australia and New Zealand have been very successful in reducing the prevalence of smoking and related morbidity and mortality in both countries. For example, based upon data from the 2004 National Drug Strategy Household Survey 17.4% of people aged 14 years or older reported they smoked daily which decreased to 16.6% in 2007 (Australian Institute of Health and Welfare 2008). Similarly, the prevalence of daily smoking amongst New Zealanders aged 15 years and older has decreased from 23.4% in 2002/03 to 18.7% in 2006/07 (Ministry of Health 2008b).

The advances in warning messages on tobacco products have been significant, and research demonstrates that such warnings represent an effective health strategy. However, it is also important, as noted above, to acknowledge that the reductions in smoking rates in both Australia and New Zealand have been the result of a combination of initiatives that have included:

- Raising the retail price of cigarettes;
- Boosting mass-reach campaigns;
- Banning displays of tobacco products at point of sale;
- Increasing penalties and enforcement of laws banning sales to minors;
- Subsidising nicotine replacement therapy for low-income smokers;
- Encouraging people to quit in every interaction with the health care system;
- and,
- Comprehensive health warnings on tobacco products (Chapman 2008).

Again, while acknowledging that tobacco and alcohol represent different psychoactive drugs and are responsible for different types of harm, the public health initiatives and

results from the tobacco field represent an important evidence base in which to consider other public health initiatives.

9.2 Lessons learnt from tobacco

While it is acknowledged that the tobacco experience cannot simply be replicated and generalised to the alcohol field, the results from research into the impact of tobacco labels do provide a pointed and sharp contrast (Wilkinson and Room 2008a). Evidence from the tobacco field categorically identifies that for warnings to be effective the warning message must:

- Depict health risks in a vivid and emotionally arousing manner, in clear simple language (Createc and Market Studies 2003);
- Be frequently updated and rotated (Strahan et al 2002; Witte and Allen 2000);
- Should include pictures rather than rely solely on text (Hammond et al 2007; Liefeld 1999; O’Hegarty et al 2006);
- Must be large and prominent (Centre for Behavioural Research in Cancer 1992; Environics Research Group Ltd. 2005; Cragg and Dawson Ltd. 1990; Strahan et al 2002; Createc 2008); and,
- Should be put on the front of packaging (Centre for Behavioural Research in Cancer 1992; Cragg and Dawson Ltd. 1990; AGB Spectrum Research Ltd. 1987; Linthwaite 1985; Environics Research Group Ltd. 1999).

In contrast, despite legislation in the U.S. stipulating that alcohol warnings “shall be located in a conspicuous and prominent place on the container” (Alcohol Beverage Labelling Act of 1988, 27 USC. Sec 215), in reality, it has been claimed that the warnings are “almost impossible to read *and* illegible,” (Senator Albert Gore, Democrat of Tennessee, as quoted in the New York Times on November 15, 1989). They also represent a small proportion of the size of the overall label; most commonly use text and not images and are not particularly graphic. In addition, the warnings from the U.S. have not altered in over nineteen years. In short, the alcohol labels lack what has been considered, in tobacco warnings, as essential elements for impact.

Research in other areas

Research from domains such as the effectiveness of warnings, disclaimers and product experience on consumers' perceptions about dietary supplement mirror many of the general findings from investigation with alcohol. For example, Mason, Scammon and Fang (2007) reported that the use of a disclaimer did not impact on consumers' beliefs about the efficacy or the safety of dietary supplements, but heavy product users were responsive to specific warning messages, consistent with some of the alcohol warning label research. The authors concluded that prior beliefs about a product are difficult to change and these beliefs act as a filter through which the warning message/disclaimer is interpreted. This is consistent with Health Beliefs research, discussed earlier, indicating that information is most likely to have impact if it is concordant with personal goals.

Research investigating the effectiveness of product placement information in relation to soy protein claims, indicated combining short health claims on the front of the package with full health claims on the back of the package leads to consumers more fully processing and believing the stated information (Wansink, 2003).

Australian research conducted by the Cancer Council of Victoria (Makin, Dobbinson and Strong, 2007), on awareness, understanding and use of the SunSmart Ultraviolet (UV) Alert which provides information on forecast variations in UV radiation levels during the day indicated that nearly half of all respondents recalled having seen the Alert. Of those who reported having seen the UV Alert on the day of the survey or in the newspaper during summer 65% reported that seeing the warning helped to remind them that they might need to use sun protection when they went outdoors. However, no conclusions could be drawn regarding the effectiveness of the Alert in prompting the use of sun protection.

The above information lends support to findings from the investigation of alcohol warning labels. That is, people have a relatively high degree of awareness of the existence of labels, but it is difficult to conclude what impact labels have on behaviour change. Such evidence also highlights the complexity of behaviour change and the difficulty that single strategies face in altering an individual's actions.

Chapter 10: Discussion

There is some contention about alcohol warning labels, despite their adoption in many countries. Various models that have been used to predict the impact of health communication in general and warning labels in particular have indicated that warning labels are likely to be noticed. They are also likely to inform (when certain conditions are met) and to be perceived favourably, particularly when they are congruent with an individual's personal beliefs. Any influence they may have on behaviour is limited and only likely to occur when other factors such as interpersonal context, providing a means to change and altering social norms and expectations have also been addressed. While behaviour change may be viewed by some stakeholders as the ultimate or only aim of warning labels, others may argue that the simple act of increasing awareness and providing information to consumers is an equally valid and successful outcome.

According to MacKinnon et al (2001) the lack of evidence to support any deterrent effect from warning labels, does not necessary imply that warning labels are ineffective. MacKinnon and colleagues argued that consistent with research by Gerbner Gross, Morgan and Signorielli, (1986) on effects of the media and in light of the Health Beliefs model and the impact of social norms (Stacy et al, 1993; Cable and Sacker, 2008), as more people are exposed to warning labels this may encourage community discussion and slightly adjust beliefs. Thus societal norms may slowly begin to change, followed by changes in the behaviour of individuals. MacKinnon et al (2001) concluded that:

“Behavioural effects of the alcohol warning may not be expected until those born after the warning appeared are adults (i.e. around the year 2009)”. (p. 226).

However, evidence supporting such a conclusion is yet to emerge.

The available research evidence about the impact of warning labels is limited. The best evidence indicates that there is some impact on respondents' recall, knowledge and perceptions of alcohol-related risk. Very little research has assessed behaviour change and in this domain the results have been mixed. There is also little evidence

about potential and actual adverse outcomes of warning labels, such as exposure to warning labels leading to an increase in consumption (MacKinnon and Lappin, 1998, MacKinnon et al, 2001).

But should warning label effects be considered in isolation? Models of health communication and behaviour change and models of alcohol related problems suggest not. The research by Kaskutas and Graves (1994) is illustrative as it demonstrated that when individuals were exposed to only one message source (i.e. warning label, poster, advertisement) there was no significant reduction in alcohol consumption. However, when the number of message sources increased so too did the likelihood that a reported reduction in alcohol use would occur.

For some analysts, interpretation of available research evidence may lead to the conclusion that “warning labels do not work”. However, such a conclusion may also be premature. There is some contention about what impact should be expected from warning labels. If the aim is to inform consumers, there is reasonable evidence that they do in fact inform consumers of risks. If the aim is to assist consumers to moderate risk, the evidence is less compelling. But, models of health communication point to the former as a more reasonable expectation and the latter only where additional strategies accompany warning labels.

Much of the research is relatively weak in a methodological sense, disallowing firm conclusions about causation and precluding bold statements as to whether warning labels do or do not “work”. The range of message content that has been evaluated has also been limited, and the visibility and style of warning labels are qualitatively dissimilar to warning labels on other products where there has been more evidence of warning label impact (e.g. tobacco products).

Finally, there is a dearth of research that will allow assessment of the cost-effectiveness/efficiency of alcohol warning labels. The lack of evidence around this issue is a challenge for government and policy makers who are required to make balanced decisions on policies in terms of safety to consumers and legitimate commercial activities.

Chapter 11: Conclusion and issues for consideration

To date, alcohol warning labels that have been adopted are relatively limited in nature (e.g. at least compared to tobacco warning labels) and have addressed only a small range of alcohol related harms. The evidence base for alcohol warning labels is limited: there is reasonable consensus that alcohol warning labels are noticed and recalled but less evidence that they have impact on behaviour. There have been few rigorous long-term and extensive evaluations of the impact of warning labels on harms associated with alcohol use and there is little evidence about their impact on behavioural intentions and behaviours specifically related to risky or high risk alcohol use.

The alcohol warning label evidence currently available does not support bold unqualified conclusions. Taking this lack of certainty into account, this report has highlighted a number of important issues for consideration. The following discussion *does not* propose that alcohol warning labels should be adopted. The aim is to highlight issues that will be important to consider *if* warning labels were to be adopted.

1. Evidence from other domains, especially tobacco use, provides some useful information. This evidence indicates that to have impact warning labels should be prominent, graphic and should incorporate images as well as text. Evidence from the tobacco arena indicates that messages are most effective when mandatory and when messages and images are frequently changed and alternated. Such approaches (at least in relation to prominence, use of images that are graphic) have not commonly been adopted in relation to alcohol warning labels and thus, of course, the impact of such approaches has not been evaluated. It is possible, given that both alcohol and tobacco are regulated, legal and psychoactive drugs, that experience from tobacco control may be generalisable to alcohol. Nonetheless, caution is indicated as there is currently no evidence to support this. In addition, there are important distinctions between tobacco and alcohol (e.g. no dose of tobacco is accepted as low risk, which is distinguished from perceptions of alcohol consumption). In the context of the above discussion, apparently limited evidence about the impact of alcohol warning labels might be

interpreted as “a paucity of opportunities for investigation and evaluation” as opposed to one of “no impact.”

2. It can be difficult to differentiate between the specific effects of warning labels and other concurrent activities that aim to prevent and reduce alcohol related harm. Models about health communication and preventing and reducing alcohol related harm and related evidence suggest that interventions such as warning labels are likely to be most effective when part of a broader strategy. If alcohol warning labels were to be adopted, they should be consistent with, and where possible linked to, current alcohol policy and related strategies in Australia and those that are identified in the impending New Zealand policy. In relation to heavy episodic drinking among youth for example, if warning labels were adopted they might focus on short-term risks associated with intoxication that are relevant to this population (e.g. unwanted pregnancy, violent assault) and should complement other concurrent strategies and activities (e.g. strategies to avoid risk, alcoholic beverage price changes, enforcement of underage purchase/drinking restrictions, potential restrictions on alcohol promotions).

This suggests the need for a coordinated approach. That is, if alcohol warning labels are adopted, it will be important to ensure communication among those tasked with oversight of the approach (e.g. FSANZ) with stakeholders (such as government agencies) who are responsible for implementing other alcohol public health strategies. Thus, for example, warning labels aimed at reducing the risk of alcohol related injury among young people should preferably be part of a broader and coordinated set of evidence-based strategies to reduce heavy episodic drinking among young people (e.g. supply control and demand reduction approaches).

3. Available evidence from the alcohol and tobacco research domains suggests that the content of any alcohol warning labels is likely to be influenced by the following:

- (i) The evidence about alcohol related harms, focussing on the consequences that are more prevalent and costly, and amenable to intervention.
- (ii) The capacity to effectively communicate information/advice about a specific issue in a warning label.

- (iii) The relationship between the label content, government policy, strategic directions and broader strategies.
- (iv) Characteristics of the consumers/target audience and target behaviours. The evidence indicates that there may be diverse needs and responsiveness of intended audiences.
- (v) Drinking behaviour of the consumers/target audience. For example, if drinking largely occurs in licensed premises, consumers may not be exposed to warning labels attached to packaged liquor. Alternative/additional health communication approaches may be required.

A significant proportion of the alcohol related burden arises from the short-term effects of alcohol. These risks include drinking and driving and operating machinery – issues which have commonly been addressed by alcohol warning labels introduced overseas. Currently, in Australia and New Zealand, there is also significant concern about other common acute risks such as violence, intentional (e.g. suicide) and unintentional injury (e.g. falls, drowning) and alcohol overdose. If alcohol warning labels are considered in Australia and New Zealand, there would be merit in considering the full range of concerns about the acute adverse effects of alcohol. Emerging Australian and New Zealand evidence about the collateral consequences of alcohol consumption (e.g. child neglect, domestic violence) might also indicate potential alcohol warning label content.

4. Consideration of warning labels may have implications for a wide range of stakeholders, including community members, governments, industry and public health experts and a judicious planning phase would include substantial consultation with such groups. Sound choices regarding labelling content and design are most likely to arise in the context of an evidence-based decision making process that includes health and social marketing expertise.

5. Where adopted, alcohol warning labels should be coupled with adequate investment to effectively evaluate their impact. Drawing on evidence to date and taking current knowledge gaps into account, this should ideally include consideration of the following:

- (i) Potential cost/benefit of the approach, to industry, the community and to government;
- (ii) Acceptability, credibility and believability of message content;
- (iii) Quality baseline data about target behaviours, including: a) knowledge about risk; b) drinking behaviour; c) risk taking relevant to target behaviour (e.g. drink driving); and d) public support for and understanding of aims of alcohol warning labels;
- (iv) Level of exposure of consumers and target audiences to alcohol warning labels;
- (v) Impact of alcohol warning labels on: a) knowledge about risk/judgement of the product's risks and hazards; b) behavioural intention relating to drinking and associated risk taking; and c) behavioural compliance or actual drinking behaviour and related risk taking.

Highest value would be obtained from evaluation which was, as far as possible able to assess the impact of warning labels in isolation and as part of an overall strategy (e.g. acceptability and believability could be assessed in isolation, but behavioural impact might be assessed as part of an overall intervention).

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Appendix 1: Examples of alcohol warning labels

Figure 4. Health warning label from a bottle of ale imported from Belgium - US

Available from:

http://www.google.com.au/imgres?imgurl=http://www.whitebeertravels.co.uk/images/sixtus_label_us.jpg&imgrefurl=http://www.whitebeertravels.co.uk/sixtus.html&h=354&w=450&sz=76&tbnid=gByu36iRTKMJ::&tbnh=100&tbnw=127&prev=/images%3Fq%3Dalcohol%2Blabels%2BUS%2Bimages&hl=en&usg=__X8prTs4socc5p0M3Bmz8DSL7pEM=&sa=X&oi=image_result&resnum=4&ct=image&cd=1

Figure 5. Health warning label from an Alcoholic beverage produced in Spain and imported to the US

Available from:

http://www.google.com.au/imgres?imgurl=http://bp2.blogger.com/_Za9dUI3jzA0/RtNOSxOS8QI/AAAAAAAAARc/pTPpf7YPuI8/s400/022.JPG&imgrefurl=http://passionatefoodie.blogspot.com/2007_08_01_archive.html&h=400&w=300&sz=18&tbnid=eS-eGStLtK0J::

Figure 6. Health warning label on a bottle of Canadian Club Whiskey imported from Canada to US

Figure 7. Health warning label on a bottle of Merlot produced in France – imported to US

Figure 8. Health warning label on a Bacardi Breezer bottle – US

Figure 9. Health warning label on a Budweiser bottle – US

Figure 10. Health warning label on a Miller Lite beer bottle – USA

Figure 11. Health warning label on a Harp Lager bottle imported from Ireland – USA

Available from:

<http://alcoholism.about.com/gi/dynamic/offsite.htm?site=http://www.cspinet.org/booze/iss%5Fwarn.htm>

Figure 12. Health warning label on bottle of Jacobs Creek Chardonnay depicting risks of drinking during pregnancy (France)

Available from: Celia Wilkinson

Figure 13. Bottles from France showing pregnancy warning labels

Available from: Celia Wilkinson

Figure 14: Bottles from South Africa- available from Celia Wilkinson (received via personal communication from Medical Research Council, Cape Town, SA)

Figure 15: Bottle from South Africa- available from Celia Wilkinson (received via personal communication from Medical Research Council, Cape Town, SA)

Appendix 2 Tobacco warning labels

Figure 16. Initial health warning on cigarette packets in Australia, 1973

Figure 17. Health warnings on Australian cigarette packages from 1994 to 2005

Figure 18. Health warnings on Australia cigarette packaging from 2006

Available from:

<http://www.tobaccoinaustralia.org.au/chapter-12-tobacco-products/attachment-12-1-health-warnings>

Figure 19. Examples from 14 health warning labels (front and back) on New Zealand cigarette packets from February 2008

Available from:

<http://www.moh.govt.nz/moh.nsf/indexmh/tobacco-warnings-new>

Appendix 3: Review of research investigating the effectiveness of alcohol warning labels.

Author(s)	Subjects	Summary of Major findings	Summary of Major Limitations
Andrews et al 1990 to 1993	Undergraduate marketing students (n=273)	<ul style="list-style-type: none"> • Warnings on birth defects and driving impairment were believable • The more favourable the attitude to drinking and then alcohol consumed the less believable the warning labels 	<ul style="list-style-type: none"> • Cannot disaggregate relative impact of content of message from credibility of source • Labels were on low alcohol beer and wine coolers • Sample not representative • Questions surrounding validity and reliability of measurements instruments used
Alcohol Research Group 1991- 2008	Primarily: cross sectional random sample of nationally representative adults across U.S.	<ul style="list-style-type: none"> • In 1991- 87% support for alcohol warning labels- but 89% indicated that warnings would have limited effect. • 6 months after introduction of warnings_ 39% of heavy drinkers, 46% of young men and 39% of women of childbearing age who were heavy drinkers reported seeing the labels. • From 1989 to 1990 there was 3% increase in the number of respondents reporting that they had used machinery after drinking • In 1990 those who had seen the labels were more likely to: <ul style="list-style-type: none"> ○ Drive when they would know they would have been in trouble if stopped by police ○ Limit their drinking because of driving ○ Had conversations about drink driving and 	<ul style="list-style-type: none"> • Difficulty disaggregating impact of warning message from other influences • Alcohol consumption based upon self report • No longitudinal data

		<p style="text-align: center;">pregnancy</p> <ul style="list-style-type: none"> • From 1989 to 1991 there was a decrease in the impact of the label on perception of risk • In 1991- 55% of sample reported that labels had affected their own drinking • In 1991 drinkers, who saw the label were more likely to report limiting their drinking when driving compared to those who had not seen the label. • People who were exposed to two message sources were 1.6 times more likely to limit their drinking • Respondents 18 to 20 paid more attention to warning labels than any other age group • Of those who saw the labels- the pregnancy warning was recalled by 89% of respondents 40 years and younger • From 1989 to 1994- awareness of warning labels increased over first four years then plateaued. • There was no effect from exposure to warnings and alcohol consumption amongst pregnant women • Those who could recall seeing the drink driving message were more likely to intervene to deter another person from drink driving 	
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Hankin et al 1993-1998	African American pregnant women from Detroit	<ul style="list-style-type: none"> • Introduction of warning labels linked to a reduction in consumption amongst light to moderate, but not heavy drinker • From 1989 to 1993 awareness of warning labels increased from 29% to 78% • Following introduction of warning labels consumption amongst first time mother decreased 	<ul style="list-style-type: none"> • No matched controls • Non representative sample • Recall of the content of the warning labels was not assessed or controlled for as a variable.
MacKinnon et al 1993 to 2001	12 th grade school students and college students from Marion County U.S.	<ul style="list-style-type: none"> • Amongst school students exposure to warning labels increased from 26% in 1989 to 41% in 1990 • Amongst college students alcohol consumption was correlated with ability to identify warning message • Warning labels had no effect on intentions regarding future consumption • Warning labels did not lead to a reduction in alcohol use, nor an increase in use. 	<ul style="list-style-type: none"> • Non representative sample

Mazis et al 1991-1996	Cross sectional telephone surveys with national sample of adults	<ul style="list-style-type: none"> • From may 1989 till may 1990 no increase in respondents perception of the risks associated with alcohol- except amongst 18-29 year olds where there was as 8.4% increase in proportion rating alcohol as very harmful • From 1989 till 1990- Heavier drinkers reported greater change in reported awareness of labels than lighter drinkers • From 1990 till 1993- increase from 35% to 55% in awareness of labels 	<ul style="list-style-type: none"> • Short follow up in first study • No control site • Potential for selection bias
Scammon et al 1991	Adults in Utah- Mormons versus non- mormons (n=,2417)	<ul style="list-style-type: none"> • In 1990- 35% of non-Mormons and 11% of Mormons were aware of the labels 	<ul style="list-style-type: none"> • No matched control site • Population not representative
Snyder and Blood- 1992	Communication undergraduate students (n=159)	<ul style="list-style-type: none"> • Warnings had no effect on students rating of product risk • Fro drinkers exposure to the warnings lead to an increase in rating of alcohol as beneficial and increase in drinking intentions 	<ul style="list-style-type: none"> • Sample non-representative • Those over 22 years of age and male non-drinkers excluded from analysis • Potential that second wave of students were aware of the study and hence potential for bias in data- demand characteristics. • Limited results presented
Malouf et al 1993	4 studies primarily with college students	<ul style="list-style-type: none"> • Horizontal labels more conspicuous than vertical 	<ul style="list-style-type: none"> • Small sample sizes • Sample not representative • Labels only placed on beer bottles

Parson et al 1994	Homeless persons Illinois (n=481)	<ul style="list-style-type: none"> In 1994- 41% of sample were aware of labels 	<ul style="list-style-type: none"> Very limited generalisability
Parker et al 1994	Random sample survey of adults in California (n>1,000)	<ul style="list-style-type: none"> Those at risk of drink driving were more likely to seen and recall labels. No evidence of behaviour change 	<ul style="list-style-type: none"> Difficult to determine how representative sample was of general population Some pre-test interviews were conducted after labels introduced- potential for confounding data
Gorn et al 1996	Canadian university students (n=55)	<ul style="list-style-type: none"> Current warning labels not rated as optimum 	<ul style="list-style-type: none"> Small sample and non representative-
Weiss 1997	Adolescents in Israel (n=3,065)	<ul style="list-style-type: none"> 89% of respondents supported introduction of warning labels 	<ul style="list-style-type: none"> Intended as baseline data but no follow up results located
Marin and Gamba 1997	Telephone survey- (n> 2,000) adults (Hispanic and non- Hispanic). San Francisco	<ul style="list-style-type: none"> From 1991 to 1992 there was an increase in awareness of labels on beer and wine containers 	<ul style="list-style-type: none"> Unclear how representative sample was Potential confound of other educational campaigns
Marin 1997	Telephone survey- (n=4,661) Hispanic (ages 21+) San Francisco	<ul style="list-style-type: none"> By 1992 96% were aware of alcohol and pregnancy message and 81% aware of alcohol and driving message 	<ul style="list-style-type: none"> No information on consent rate- hence potential for selection bias Across the four years the groups differed on a number of demographic variables

DeCarlo et al 1997	Interviews with 111 undergraduate students and 39 adults	<ul style="list-style-type: none"> • 59% read the warning labels on product before buying them • 59% were aware of such labels • 56% found the info on labels informative 	<ul style="list-style-type: none"> • No information on consent rate- hence potential for bias • Sample was disparate and recruitment through personal solicitation • No information on whether sample included non-drinkers • No gender information provided in results
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Creyer et al 2002	US versus Australia university students (n=274)	<ul style="list-style-type: none"> Type of warning had no significant effect on perception of social or health benefits of alcohol but did effect perception of risk of drinking behaviours 	<ul style="list-style-type: none"> Sample size relatively small- questions of generalisability and limited to consumption of beer
Blume and Resor 2007	Convenience sample Mexican women (n=99)	<ul style="list-style-type: none"> English language skills predict ability to remember health warnings on beverage containers 	<ul style="list-style-type: none"> Small sample Length of time in country and hence exposure to labels not controlled for

Appendix 4: List of the review papers identified

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