INDEPENDENT REVIEW OF THE EFFECTS OF ALCOHOL PRICING AND PROMOTION

Part A: Systematic Reviews

Systematic Review Team

Andrew Booth (1)
Petra Meier (1)
Tim Stockwell (4)
Anthea Sutton (1)
Anna Wilkinson (1)
Ruth Wong (1)

Research Team

Alan Brennan (1)
Daragh O'Reilly (3)
Robin Purshouse (1)
Karl Taylor (2)

Principal Investigator: Petra Meier (1)

1. ScHARR, University of Sheffield
2. Dept of Economics, University of Sheffield
3. Management School, University of Sheffield
4. Centre for Addiction Research BC, University of Victoria, Canada

Project Report for the Department of Health
September 2008

Contact:
Dr Petra Meier
Senior Lecturer in Public Health
School of Health and Related Research
University of Sheffield, UK
Tel (0044) 114 2220735
Email: p.meier@sheffield.ac.uk

CONTENTS

TABLES

FIGURES

Acknowledgements

This is an independent report commissioned and funded by the Policy Research Programme in the Department of Health. The views expressed are not necessarily those of the Department.

The team wishes to thank the many scientists in the alcohol policy field who generously shared knowledge and evidence, especially the three peer reviewers who despite very short timescales provided very valuable feedback.

The team

This project team combined the strengths of The University of Sheffield's School of Health and Related Research (ScHARR), Department of Economics, and School of Management; and the University of Victoria's Centre for Addictions Research of British Columbia (CARBC), Canada.

Petra Meier works as Senior Lecturer in Public Health in ScHARR. Her research expertise is in the drugs and alcohol field. She has a special interest in the application of modelling in the medical and social sciences, having recently led a multi-disciplinary project on modelling policy interventions for gun crime. As principal investigator, she co-ordinated the team's efforts and advised the reviewers and modellers on issues to do with alcohol consumption and resulting harm. **Andrew Booth** is the Director of the ScHARR Section of Information Resources, which has been at the forefront of research on systematic review methodology for many years. With twenty five years' experience as a health information professional, he has published numerous systematic reviews of evidence across a range of health areas including for the NHS Health Technology Assessment Programme. His team (**Anthea Sutton**, **Anna Wilkinson** and **Ruth Wong)** completed the literature searches, reference management, document acquisition and production of evidence tables carried out the work for Phase 1, the systematic reviewing component of the study. **Tim Stockwell** (University of Victoria, British Columbia, Canada) is a leading expert in the field of alcohol policy and has carried out similar studies in Canada and elsewhere. He is currently director of the Centre for Addictions Research BC, a multi-site and multi-campus enterprise dedicated to research and communication evidence-based approaches to reducing alcohol and other drug related harm. **Alan Brennan** (Director of the Health Economics and Decision Sciences Section, ScHARR) is a senior modeller who has been developing models in support of healthcare decision-making nationally and internationally across a large range of diseases, interventions and policy issues. His responsibility is to oversee Phase 2 of the project, the modelling of the effects of policy interventions. **Daragh O'Reilly** (Marketing Research Group, School of Management) researches the link between marketing, branding and consumption. He is the past chair of the Academy of Marketing's Group on Social Marketing. He contributed valuable expertise in the current thinking around promotional practices. **Robin Purshouse** (Health Economics and Decision Sciences, ScHARR) has developed models to support government decision makers in a variety of policy and implementation areas. **Karl Taylor** (School of Economics) is a senior economist specialising in applied microeconometrics and led the work on economic parameters. He leads on the estimation of price and promotion elasticities.

Structure of the report

The report commences with an overview of the aims and objectives of the research, followed by a brief outline of key trends in alcohol consumption, alcohol related harm and the alcohol market. Next, there is a short section detailing our understanding of current alcohol advertising and promotion strategies as relevant to the UK market and the regulatory framework guiding UK alcohol marketing activities. We end with the three review reports. This report is accompanied by the report *Modelling the Potential Impact Of Pricing And Promotion Policies For Alcohol In England: Results From The Sheffield Alcohol Policy Model*.

Overview

This report presents the results of the first phase of an investigation into the effects of pricing and promotion on alcohol consumption and related harm in the UK, commissioned through the Policy Research Programme, National Institute for Health Research, Department of Health.

Recent research on alcohol policies has made it possible to rank policies and interventions according to their effectiveness in controlling excessive alcohol use and alcohol-related harm. The evidence suggests that there are a large range of effective strategies from which policy decision-makers can choose (Jahiel & Babor 2007, Stockwell et al 2006). However, it appears that some ineffective strategies tend to be particularly fashionable whereas strategies that are more effective can be unpopular (Brand et al, 2007). The English Government recently published the updated National Alcohol Strategy (Department of Health, 2007), which, among other things, proposes to tackle those pricing, marketing and promotional practices which may harm alcohol consumers, especially those most vulnerable to the negative effects of alcohol. A policy that leads to price increases of alcoholic beverages is likely to be one of the less popular policy choices, with both consumers and industry, and policies restricting promotional activity could potentially have significant detrimental influences on the alcohol industry. Therefore, it is imperative that such policy decisions are based on a sound evaluation of existing evidence (Phase 1 of our work) and pre-testing of the likely impacts of policy changes (Phase 2).

Aims and Objectives

The primary objective of our research was to provide answers to key questions about the relationship between alcohol promotions including pricing, level of consumption, alcohol-related harm and the likely social, health and economic costs and benefits of planned or potential policy interventions.

Specifically, our team was commissioned to

a) systematically review the evidence on the link between the price and promotion of alcohol on the one hand and patterns of consumption and alcohol-related harm on the other as well as the effectiveness of related policy interventions (Phase 1)

b) indicate how the promotion and pricing of alcohol affects total alcohol intake, and patterns of consumption in groups identified as priorities by government, namely underage drinkers, young adult binge drinkers, heavy drinkers, and those on low incomes (Phase 1) and

c) model the potential implications of changes to current policies, especially the impact on health, crime, and employment (Phase 2).

In Phase 1, the topic of this first report, we have carried out a systematic review of the evidence base on the relationships between the various types of alcohol promotions, alcohol pricing, alcohol consumption and alcohol-related harm. Where evidence permits, we report separately on different types of alcohol and groups of consumers (including underage drinkers, young adult binge drinkers, heavy drinkers and those on low incomes). Harms are defined widely and include health, social and crime-related harms on individuals and communities.

In Phase 2, based on the findings of the review, available data and current government priorities, we select a number of policy alteratives and model their differential impact on alcohol consumption and alcohol-related harms. Where possible, we model the effects of policy changes on the identified priority groups. The model provides a decision making tool, enabling policy makers to answer what-if questions, to predict the likely downstream impact of different policy scenarios and to identify areas of uncertainty and research priorities for different policy options.

.

Background

UK alcohol consumption and expenditure trends and patterns

The trends and patterns of drinking in the UK are well documented[1] and only a brief summary of the key facts is provided here. HM Revenue and Customs data on alcohol clearances (HMRC 2008) show that overall there has been an increase in per capita consumption of 2 litres of pure alcohol between 1992 and 2004 with smaller fluctuations since then (Fig 1). In 2007/8, the per capita clearance was 11.53 litres of pure alcohol.

In the UK, alcohol consumption is mostly reported in alcohol units. Many other countries use the concept of standard drinks, the alcohol content of which varies by country. Therefore, much of the research literature reported in Review 3 reports uses g or ml of pure alcohol. One UK unit corresponds to 10 ml (or 8g) of ethanol.

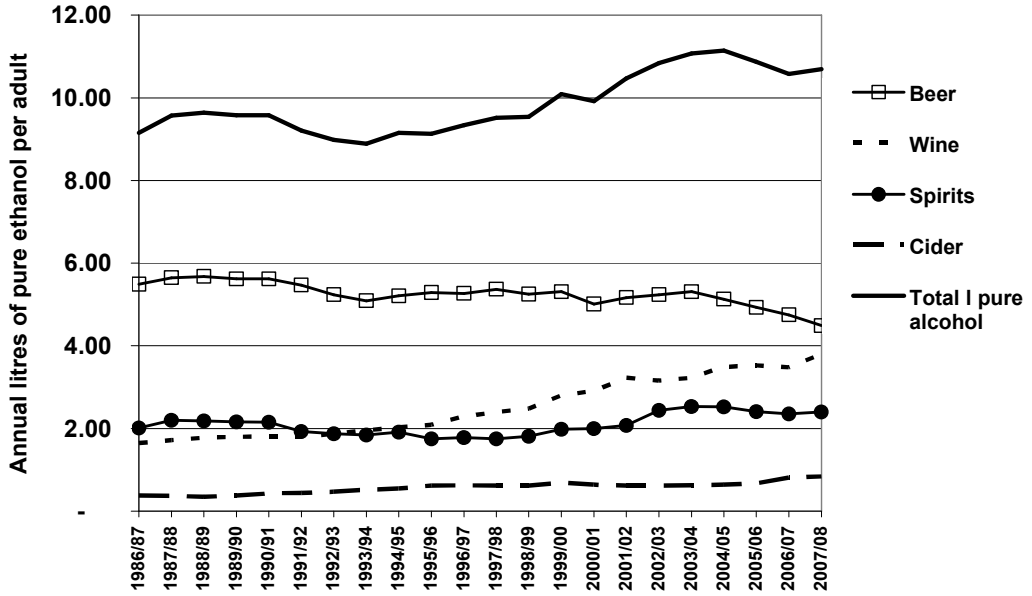


Figure 1. Alcohol clearances 1986/7-2007/8. Source: HMRC 2008.

Based on household survey data, the average weekly amount drunk in 2007 was estimated to be 18.6 units for men and 9.9 units for women when including abstainers, or 23.5 (men) and 14.4 (women) units when looking at those who consumed at least one unit in the past week (General Household Survey 2006 and ONS Omnibus Survey 2007).

The UK government advises that adult men should not regularly drink more than 3-4 units of alcohol a day, and that adult women should not regularly drink more than 2-3 units a day (Department of Health, 2007). In the 2006 GHS, 40% of men and 33% of women reported exceeding the daily limit on at least one day in the past week. The tendency to consume beyond the limit is dependent on age; young people are most likely to exceed recommended limits. In young people, the gender difference in overall levels of consumption is very small, whereas in older age groups, men are clearly the heavier drinkers. GHS data suggests that for the past ten years, the rates of men regularly exceeding the government's recommended daily limits have remained relatively stable, whereas the prevalence of higher-risk drinking in women has been increasing in recent years.

[1] For example, see NHS Information Centre: Statistics on Alcohol 2008 and Association of Public Health Observatories: Indications of Public Health in the English Regions 8: Alcohol, 2007.

Binge drinking is here defined as drinking more than twice the daily recommended allowance, i.e. >8 units per day for men and >6 units for women, in a single session. In the 2006 GHS, 23% of men and 15% of women reported engaging in at least one episode of binge drinking in the past week. Younger age groups were much more likely to binge drink (29% of men and 26% of women aged 16-24). Trends in the prevalence of binge drinking have been largely stable for the past decade. It needs to be borne in mind that because of recollection and social desirability bias, general household surveys are known to substantially underestimate actual levels of drinking, and especially levels of binge drinking (Stockwell et al 2004), thus the above figures are likely to be lower than actual proportion of heavy and binge drinkers in the population.

Harmful drinking is defined, by government, as regularly drinking >50 units per week for men or >35 units for women. In the 2006 GHS, 9% of all men and 7% of all women under the age of 65 reported drinking at this level in the past week, a slight increase since 1998. For those who had had at least one drink in the previous week, the corresponding proportions rose to 12% of men and 9% of women under the age of 65.

In terms of the likely effects of price on heavy drinkers, we were interested to describe how alcohol consumption is distributed in the population. We estimated total annual alcohol intake using GHS 2006 data on weekly consumption, and split the population into deciles according to the level of alcohol intake. Results show that **the top 30% of drinkers consume nearly 80% of the total alcohol volume** (in pure ethanol) consumed in the UK, whilst the bottom 30% of drinkers consume only 2%. Again, it is worth mentioning that problem drinkers are likely to be underrepresented in this general population sample.

In children, the likelihood of ever having tried alcohol is dependent on age, increasing from 21% of 11-year-olds to 82% of 15-year-olds, with few gender differences (SDD, ONS 2006). Asked about past week drinking, which is often used as an indicator of regular drinking, 41% of 15-year-olds had had a drink, compared with 29% of 14-year-olds, 16% of 13-year-olds, and 8% and 3% of 12- and 11-year-olds. Looking at trends, the proportion of children who drank in the past week appears to have increased in the mid-90s, but has decreased since the turn of the millennium. There is however a pronounced trend towards heavier consumption in those who do drink (Fig 2), and the trend is most pronounced in the youngest. 11-13 year old girls reported having drunk an average of 8 units in the past week, and boys of the same age drinking 12 units. At age 15, the level of consumption by those who drink matches and surpasses that of many adult groups (14 units for boys and 11 units for girls).

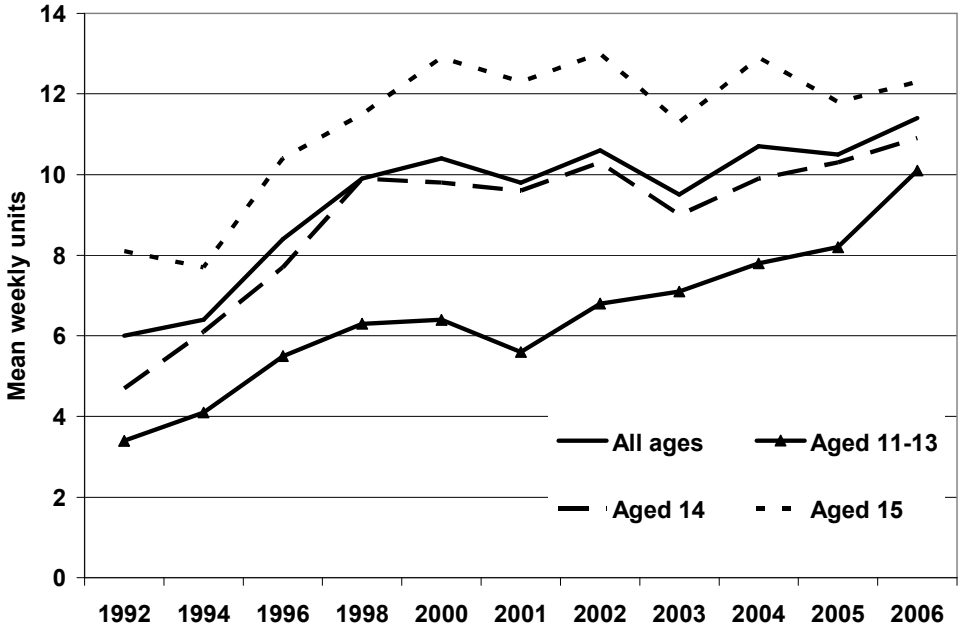


Figure 2. Mean weekly units consumed by 11-15 year olds who have ever had a drink. Source: ONS Statistics on Alcohol 2008.

Data collected in the annual Expenditure and Food Survey (EFS) and its predecessor, the Family Expenditure Survey, allow the examination of trends in the average weekly expenditure on alcoholic drinks. Trends show that expenditure on alcohol rose sharply up to 2003 and increased less sharply since then. Overall, each year individuals spent an extra 10p per week on alcohol than in the previous year, which represents a 4-6% annual rise and is above the average levels of inflation for these years. Slightly more is spent on drinks consumed outside the home (56% of the total expenditure on alcohol). There is a strong linear relationship between income and expenditure for alcohol. Whilst households in the lowest 10% income bracket spend, on average, under £5 per week on alcohol, those in the top 10% income bracket spend over £28 per week.

Overall, data show that there has been an upwards trend in both population-level consumption and expenditure on alcohol, that drinking at levels exceeding the government's recommended sensible drinking limits is wide-spread, and that a significant proportion of children drink alcohol and those that do tend to drink increasing amounts.

Alcohol-related harms

Harms are classified as alcohol-specific of alcohol-related, and can be either chronic or acute. For alcohol-specific harms, all cases of such a disease or harm are directly linked to the consumption of alcohol (for example, alcoholic liver disease, arrests for being drunk and disorderly). For alcohol-related harms, alcohol consumption is a contributory factor in a proportion of cases (for example, certain cancers, road traffic accidents, violent assaults). Chronic harms are those that occur only after a period of sustained alcohol consumption (e.g. alcohol dependence), whereas acute harms are those that are associated with a single occasion of drinking (e.g. road traffic accidents, alcohol poisoning).

A 2003 report on alcohol-related harm estimated the annual cost of health, crime and employment problems caused by alcohol consumption at around £20bn a year (Prime Minister's Strategy Unit, 2003). Since then, trends in alcohol-related harm seem to indicate further increases, and two examples, alcohol-related hospital admissions and alcohol-specific mortality rates, are shown below.

NW Public Health Observatory statistics show alcohol-related hospital admissions are rising by 80,000 admissions a year, with 811,000 admissions (6% of all admissions) in 2006 (Fig 3).

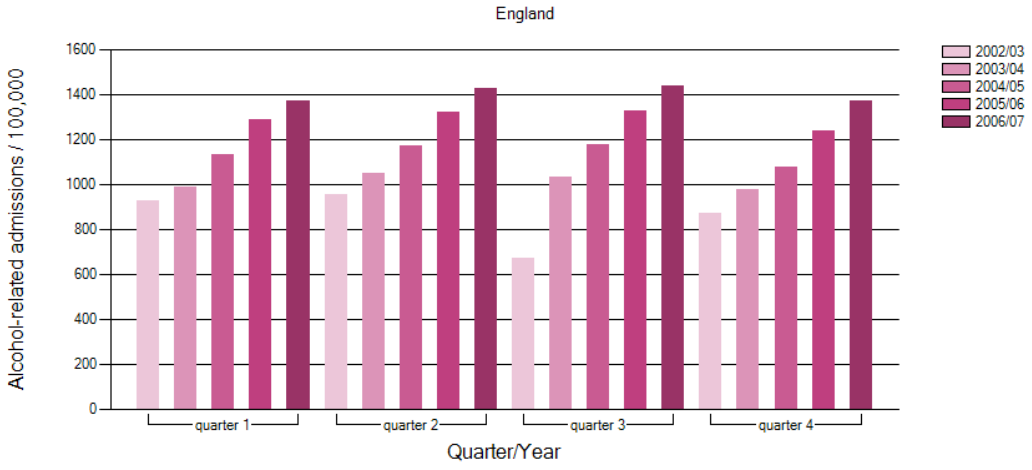


Figure 3. Quarterly alcohol-related admissions. Source: NWPHO: Local Alcohol Profiles, 2008

Alcohol-specific mortality rates started rising very sharply between 1993 and 2000, with slower rises after 2004 (Fig 4). The male death rate is substantially higher than the female death rate and the gap is widening – the male death rate has more than tripled since 1980,

the female death rate has doubled. The female death rate is now at just under 8.8 per 100,000 and the male rate is more than double that at 18.3 per 100,000.

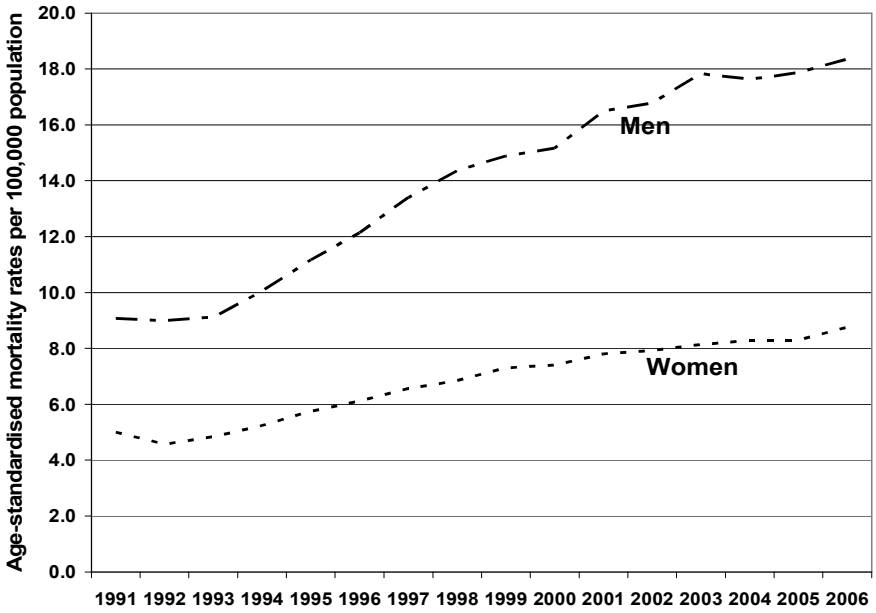


Figure 4. Age-standardised death rates (per 100,000) from alcohol-specific diseases, UK 1991 to 2006: by sex. Source: ONS Death rates from alcohol-related diseases 2008.

Trends in alcohol pricing and promotion

Consumer expenditure

The total annual consumer expenditure on alcohol was estimated to be £42 billions in 2006 (WARC, 2008). In terms of volume of sales, the off-trade[2] market share accounts for 83% of the wine, and 43% of the beer market (BBPA 2007, Mintel, 2007) and in the off-trade, the major supermarkets dominate with almost two-thirds of the market share (AC Nielsen 2008). The off-trade versus on-trade share has been growing steadily for many years (WARC 2008, Mintel, 2007), possibly due to alcohol prices in the off-trade increasing at a rate far lower than the price inflation for most products, whereas prices in the on-trade have increased substantially.

Alcohol affordability

ONS information[3] is available on alcohol prices compared with the all-items Retail Price Index (here called "alcohol price index") and real households' disposable income. From this, an "affordability of alcohol index" can be created, which relates the alcohol price index to income trends. In comparison to 1980, alcohol was 69% more affordable in 2007 (Fig 5). Data is also available, from 1987, on the difference between on-trade and off-trade price developments of wine and beer. Figure 6 shows that whilst on-trade beer and wine were 36% and 46% more affordable in 2007 than 1987, off-trade beer and off-trade wine were 139% and 124% more affordable, respectively.

[2] In the UK, the term off-trade is used to describe alcohol retailing for consumption off the premises (e.g. supermarkets, petrol stations, off-licenses), on-trade is used for alcohol retailing for consumption on the premises (e.g. pubs, clubs, restaurants)
[3] http://www.statistics.gov.uk/downloads/theme_economy/Focus_on_CPI_April_2008.pdf

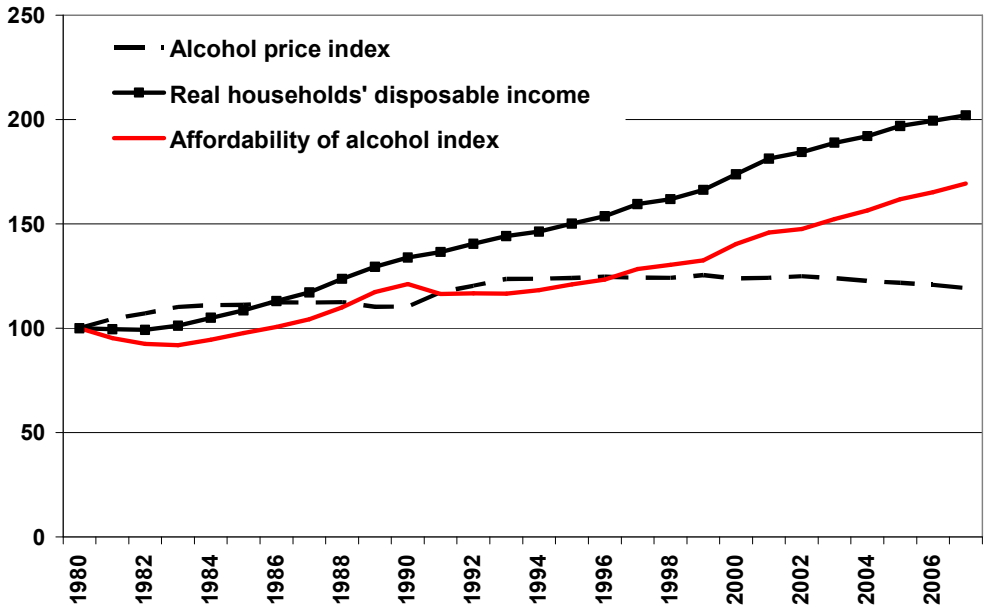


Figure 5. Affordability of alcohol (Source data: Information Centre)

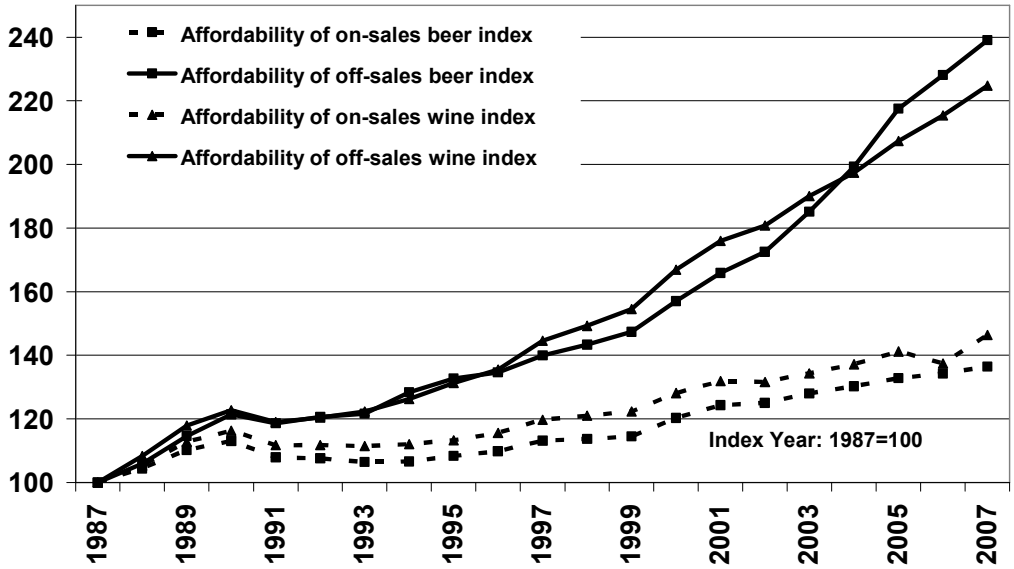


Figure 6. Affordability of alcohol, beer and wine, on-and off-trade comparison

Our account of the marketing of alcohol starts from the fact that it is a behaviour intended by capitalistic organisations to deliver a return to their shareholders. The success of these organisations in generating satisfactory streams of earnings per share helps to make them an attractive investment, and thereby to ensure their continued survival in the market for equity capital. The leading alcohol providers are international conglomerates pursuing ambitious growth strategies. Alcohol marketing activities are designed to maximise international sales turnover and gross contribution.

Advertising expenditure

The total recorded annual advertising expenditure on alcohol was in the region of £163m[4] to £198m (WARC 2007) - these figures include TV, outdoor, press, internet, cinema and direct mail advertising, but not all "below-the-line" expenditures. Of this, almost half (48%) was TV spend, followed by the outdoor (22%) and press (19%) channels. Around half of the annual advertising expenditure is accounted for by beer (48%), followed by ciders (12%) and wine (10%). Overall drinks advertising expenditure rose sharply in the mid-to-late 90s, but has since levelled off. As will be discussed below, advertising is only a proportion of all promotional activity.

Marketing and promotion

The marketing of alcohol is aimed at profitably recruiting and retaining customers. Given corporate growth objectives, there are a number of generic strategies for achieving market growth at the firm level, namely: convert non-users, enter new segments, increase the usage rate of existing customers, and capture market share from competitors. At firm level, investment to improve competitive strength and brand development are also key strategies. Strategies for the marketing of alcohol involve the segmentation of consumers, the targeting of specific groups of consumers and the symbolic and competitive positioning of the organisation's relevant offering in relation to the target segments – an important consideration for our review's special interest populations of young drinkers, low income drinkers and regular heavy drinkers. Conventional thinking about marketing strategy has it that these three strategic processes should precede the development of the tactical marketing mix, which includes the product, price, promotion, and place (distribution).

From the marketing point of view, the approach taken in this inquiry is that promotion is a part of marketing strategy, which in turn is part of corporate strategies which aim to achieve corporate objectives, typically increased earnings per share, sales value or volume, market share or some other measure of growth in market/financial return. For the purposes of this inquiry, we have read the word 'promotion' to include any kind of communication by alcohol marketers, in line with recent developments in business communications theory.

Alcohol is a product category that is heavily supported by advertising and promotion relative to other categories. The contemporary marketing communications practices and components used by alcohol providers within the UK are wide-ranging and include: any branding practice in general; public relations; corporate communications; TV advertising; radio advertising; print advertising; internet advertising and viral or social e-network marketing; cinema advertising; outdoor advertising; retail sales promotion; trade promotions; direct marketing; personal selling; packaging (multi-pack, design, aesthetics, shape, size); point of sale/point of purchase; merchandise; mobile phone communications; the development of brand identities, brand logos and other aspects of visual identity; product placement; celebrity endorsement; sponsorship; product competitions; event-related marketing; and heritage marketing.

Only a small proportion of these promotional practices and elements are the subject of detailed measurement, and such information tends to be closely guarded due to its sensitive commercial nature. This hampers efforts of academic researchers to evaluate systematically the effects of advertising and promotion, which, as we will see in Review 2, relies heavily on crude indicators such as annual advertising expenditure on selected channels or average TV viewing hours. What research there is will be reviewed in Review 2, however, it needs to be borne in mind that such research will only ever cover a very small proportion of the marketing mix used by the alcohol industry.

[4] Creative Club 2007 data obtained by authors

Influences on Alcohol Pricing

Alcohol prices are determined by a range of factors (Huang et al 2003; IAS 2007), including cost to the producer and retailer, strategic decisions about profit margins sought at product and total sales level, levels of taxation (excise duty and value added tax), and the balance between supply and demand.

Apart from indicating the cost to a prospective purchaser, the price of an alcohol product can be regarded as a market signal, which positions the product in terms of value-for-money in the consumer's mind. Pre-purchase, high prices can help to convey an impression of quality, whereas, especially temporarily, low prices may suggest very good value for money in the sense of a bargain. From the provider's point of view, price is a key to optimising the contribution from sales revenue. The relationship between sales volume, fixed and variable costs and revenue stream needs to be managed in the shareholder's interest. Quite apart from this general business requirement, the pricing of alcohol at retail level may be influenced by other factors, such as, for example, intra-organisational pricing strategies, foreign exchange considerations, target return on investment, competitor activity, and category management tactics. That said, two alcohol marketing/pricing strategies have become salient in recent years, namely premiumisation and below-cost selling. Premiumisation involves the prioritisation of certain brands for investment resource allocation, in terms of production, product innovation, marketing spend and distribution. In this strategy, price and promotion are inextricably linked. Higher prices work to signal higher quality, and the promotion aims to confirm this impression to the consumer.

Premiumisation usually leads to a range of different price points for a given product, which suggest different levels of product quality. The strategy is used across a wide range of alcohol drinks, more commonly perhaps in spirits, but including whisky, brandy, champagne and lager.

Below-Cost Selling

While the international drinks conglomerates are focused on building premium brands, and this tends generally speaking to work well in the on trade, UK supermarket chains (grocery multiples) have a different strategic logic. As the gateway to the consumer, the multiples have long enjoyed significant commercial power in relation to their suppliers. Heavy price discounting or promotion is a key component of their marketing strategy. Below-cost selling is used for a number of reasons, including the protection of category share and the promotion of new products. The danger for drinks brands is the dilution of brand value by heavy retail discounting; one counter-measure is to upgrade products and divert them to more profitable markets at a higher price point.

The Competition Commission recently reported on a range of issues having to do with the practices of grocery multiples (2008). The Commission noted that:

> *it was argued by the Royal College of Physicians and others that the widespread availability of cheap alcoholic drinks in grocery stores was encouraging an increase in alcohol consumption, including so-called binge drinking and consumption by those under the legal age limit, leading in turn to violence, disorder and loss of social cohesion.*

The recent Competition Commission report found in fact that UK grocery multiples were selling a range of categories below cost. Revenue from below-cost selling in general represents about 3% of sales. The CC defines below-cost selling as follows:

> *Below-cost selling is where a retailer sells an item to consumers for less than the input cost. For the purposes of our analysis, we have defined a product as being sold below cost if it has a negative gross margin. We calculated gross margin as cash at the till less cost of goods and any adjustment for VAT (where required), and adding back any markdowns (e.g. goods close to sell-by date) and some types of promotional funding (e.g. multi-buys).*

In fact, alcohol was one of the two main categories which were the subject of below-cost selling. It found that: 'The period during which individual products are sold below cost ranges between 8 and 25 weeks. Branded products are generally sold below cost for shorter periods than own-label products'. The period May to July is a peak period for alcohol sales, particularly of multipack offers.

The current regulatory framework

The following graphic (Figure 7) summarises self-regulation within the UK drinks industry.

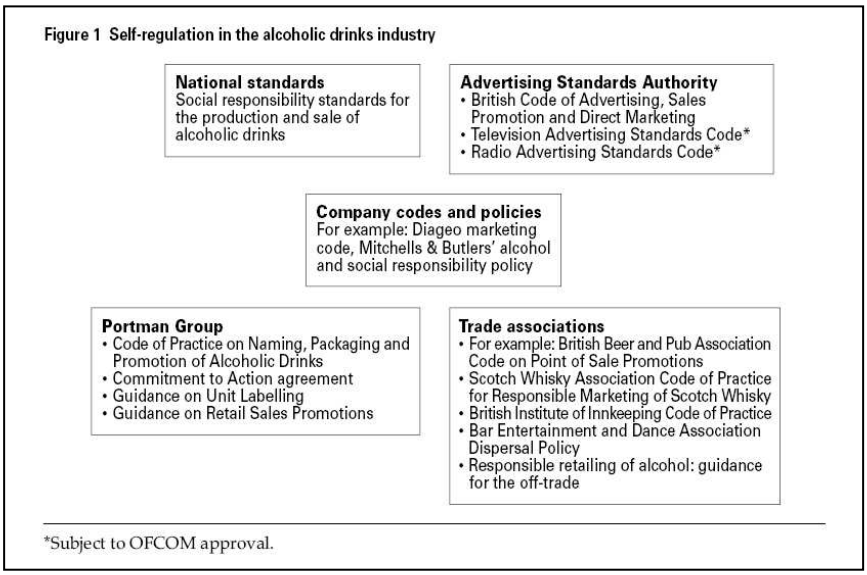


Figure 7. Self-regulation in the alcoholic drinks industry (Joseph Rowntree Foundation 2006, Fig 1, p. 20)

Regulatory Authority for Advertising

The Advertising Standards Authority (ASA) is the UK independent regulator that checks advertising code compliance. Non-broadcast advertising is covered by the CAP Code. Broadcast advertising is covered by the Radio Advertising Standards Code, the TV Advertising Standards Code, the Advertising Guidance Notes, Rules on the scheduling of TV advertisements, the Code for Text Services, and the Guidance on Interactive TV. The CAP code is the eleventh edition of the British Code of Advertising, Sales Promotion and Direct Marketing and came into force on 4 March 2003. Its general rules cover issues such as: substantiation, legality, decency, honesty, truthfulness, matters of opinion, fear and distress, safety, violence and anti-social behaviour, political advertising, protection of privacy, testimonials and endorsements, prices, availability of products, guarantees, comparisons with identified competitors and/or their products, denigration and unfair advantage, imitation, recognising marketing communications and identifying marketers, advertisement features and free offers, the protection of children and database practices. A similar range of issues is covered in the broadcast advertising codes.

<u>Control Processes</u>

The regulation of the promotion of alcohol products operates at a number of levels. The planning and execution of alcohol promotional campaigns is subject to various control mechanisms. Firstly, in the course of campaign planning, the firm will discuss the issue of code compliance with its marketing communications agency. Secondly, compliance may also be checked within an individual firm. Thirdly, within the UK, a proposed advertising campaign may be referred to the Portman Group for a view on its compliance. Fourthly, the Advertising Standards Authority regulates the promotion of alcohol across a number of media. The ERDF

(European Responsible Drinking Federation) is an umbrella industry body, which publishes reports on compliance.

References: Introduction

AC Nielsen (2008). Top 100 Brands Report.
BBPA (2007) Statistical Handbook 2007
Brand DA, Saisana M, Rynn LA, Pennoni F, Lowenfels AB (2007). Comparative analysis of alcohol control policies in 30 countries. *PLoS Med*. 4 (4):e151.
Department of Health (2007) Safe. Sensible. Social. The next steps in the national alcohol strategy. London: Department of Health.
Goddard (2008). Drinking: adults' behaviour and knowledge in 2007. Office of National Statistics
Huang C.D. (2003). Econometric models of alcohol demand in the United Kingdom. Government Economic Service Working Paper No. 140. HMCE, London
HMRC (2008). Alcohol Factsheet July 2008. Available on: http://www.uktradeinfo.com/index.cfm?task=factalcohol
Information Centre (2008). Statistics on Alcohol: England, 2008.
Institute of Alcohol Studies (2007) Alcohol: tax, price, and public health. IAS, London.
Jahiel, R. I. & Babor, T. F. (2007). Industrial epidemics, public health advocacy and the alcohol industry: lessons from other fields. Addiction 102(9): 1335-9.
Joseph Rowntree Foundation (2006): Alcohol Strategy and the Drinks Industry.
Mintel (2007): Report on the Wine Market
North West Public Health Observatory (2007) Indications of public health in the English
Regions 8: Alcohol. Liverpool: North West Public Health Observatory.
Office of National Statistics (2007) Smoking, drinking and drug use among young people in England 2006. Report.
Prime Ministers Strategy Unit (2003). Alcohol Project: Interim Analytical Report. London: Cabinet Office. Report.
SHAAP (2007) Alcohol: Price, Policy and Public Health. Report.
Stockwell, T.R., Donath, S., Cooper-Stanbury, M., Chikritzhs, T., Catalano, P. and Mateo, C. (2004). Under-reporting of alcohol consumption in household surveys: a comparison of quantity-frequency, graduated-frequency and recent recall. *Addiction, 99 (8)*.
Stockwell, T. (2006) Alcohol supply, demand, and harm reduction: What is the strongest cocktail? Commentary. International Journal of Drug Policy 17 269–277
WARC (2007). The Advertising Statistics Yearbook 2007
WARC (2008). The Marketing Pocket Book 2008.

Systematic Reviews

Background to the reviews

The research question was conceived in three separate and yet connected parts:

1. Investigating the relationship between **Tax/Price** and **Alcohol Consumption** or directly to **Harm** ***[Review 1]***
2. Investigating the relationship between **Advertising/Promotion** and **Alcohol Consumption** or directly to **Harm** ***[Review 2]***
3. Investigating the relation between **Alcohol Consumption** and **Outcomes**. Outcomes include either health and health service-related outcomes (e.g. those relating to chronic disease, traffic accidents) or societal outcomes (e.g. those relating to crime or employment) ***[Review 3]***. Neither Review 3 nor the subsequent modelling work is required to extend to include beneficial effects in terms of individual "feel good" factors or general quality of life. However the evidence for supposed health benefits such as cardioprotection and reduced risk of stroke is examined.

These reviews were conceived as three separate analyses each requiring a different type of evidence base and engaging with different bodies of literature. Methodological challenges posed by different types of evidence and issues of causation and direction of influence are discussed in detail at the end of this methodology section.

Methodology

A review was undertaken according to systematic review principles. The methodology used closely followed the review framework described in the NHS Centre for Reviews and Dissemination (CRD) Report No. 4, *Undertaking Systematic Reviews of Research on Effectiveness* (Khan et al, 2001). For Review 3 on the relationship between alcohol consumption and outcomes, a review of reviews was undertaken. According to the Government Social Research Unit[5] a review of reviews is appropriate where there has already been considerable research and a number of research reviews undertaken in a particular area. The limitation is that it will obviously not pick up research outside of existing reviews. Also, as reviews are of variable quality each individual review needs to be screened to assess how systematic and comprehensive it is. The review of reviews shares the systematic approach with other systematic review methods. It has the advantage of generally being quicker than other types of full systematic review.

Search strategy

Sources

Multiple methods were used to identify relevant literature. Sensitive search strategies were employed in searching the following major electronic bibliographic databases and resources:

Health

- Medline
- Medline In-Process
- Cochrane Database of Systematic Reviews
- Cochrane Central Register of Controlled Trials
- Database of Abstracts of Reviews of Effects (DARE)
- Health Technology Assessment (HTA)
- NHS Health Scotland

Health-related

[5] http://www.gsr.gov.uk/professional_guidance/rea_toolkit/what_is_an_rea/methods_for_reviewing_evidence/review_of_reviews.asp

- PsycINFO
- Cinahl
- Health Management Information Consortium (HMIC)

Science

- Science Citation Index (SCI)

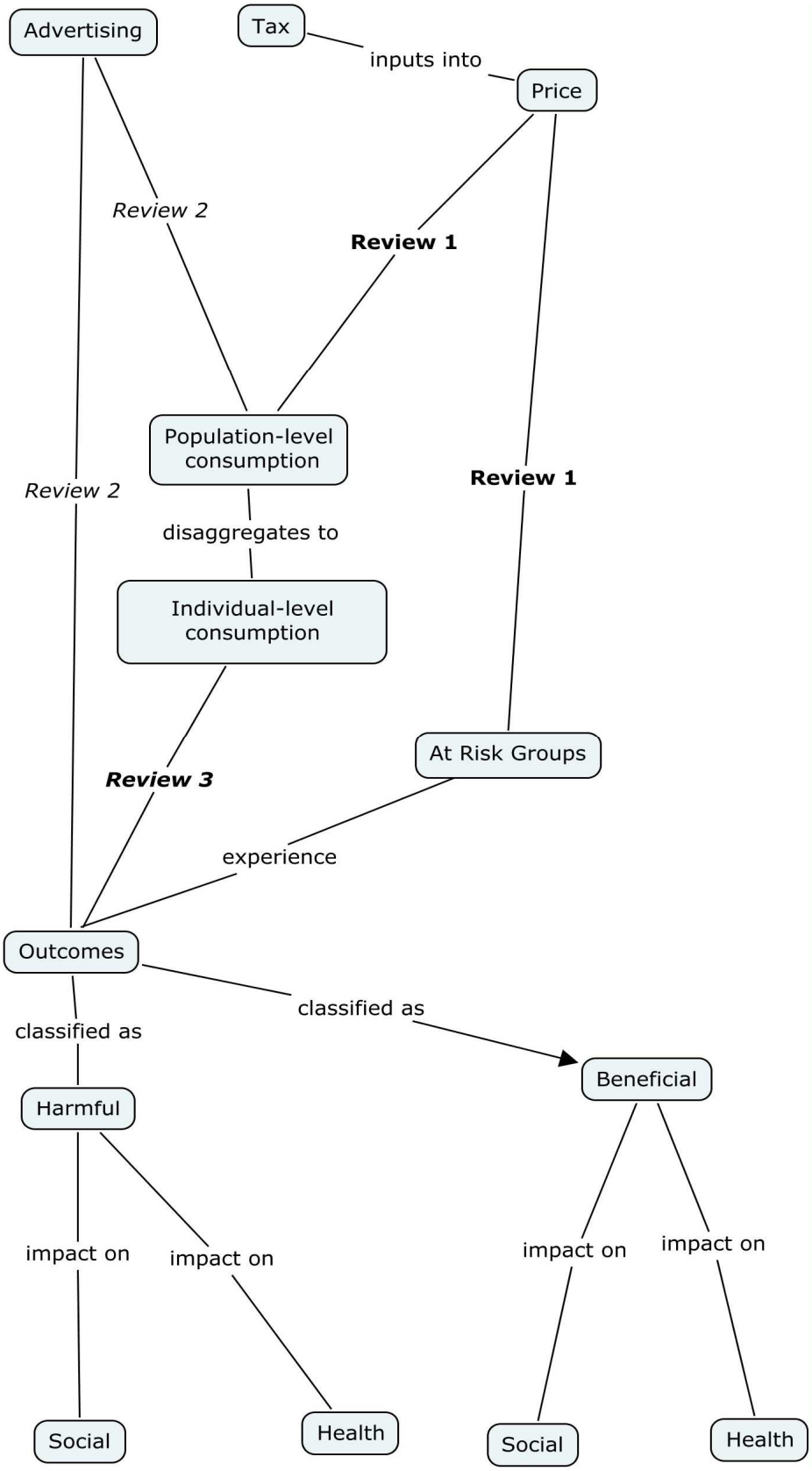


Figure 8. Conceptual Schema of the Reviews

Social science
- Social Sciences Citation Index (SSCI)
- ASSIA
- Social Care Online
- Social Services Abstracts
- EPPI-Centre

Economics
- NHS Economic Evaluations Database (NHS EED)
- EconLit

Education
- ERIC
- British Education Index

Marketing
- Association for Consumer Research
- Chartered Institute of Marketing
- EBSCO
- Emerald Marketing Journals
- WARC

Alcohol-Specific
- DrugScope
- Project Cork

Retrieval of 'grey' literature

Grey literature, including evaluations and empirical studies, reviews and guidance documents, has been retrieved from targeted Internet searches, from the websites of organisations judged to be relevant to the review and from in-house files. Contact with experts was also used to obtain unpublished and imminently published materials. Most of the grey literature was used for background and contextual purposes with the majority of research studies being identified from the bibliographic subject searches and from follow up of reference lists

Search terms

A combined free-text and thesaurus approach was adopted. Search terms included: “alcohol drinking”, “alcoholic beverages”, “campaign$”, “promot$”, “advert$”, “publicity”, “market$”, “pric$”, “tax”. The search was limited to English language only and to research or systematic reviews published after 2000 to ensure currency and applicability of the research. An example of the search strategy used is found in Appendix 1.

In addition, a specific search was conducted to identify reviews on the harmful effects of alcohol. This search was limited to English language only, research and systematic reviews published after 2000. A full search strategy can be found in Appendix 2.

Inclusion Criteria

Types of studies

1) Systematic review
2) Research study
3) Data analysis – studies reporting quantitative data from routine or ad hoc datasets regardless of whether or not they have an empirical base.
4) Economic study – in the broadest sense to include cost studies as well as economic evaluations.

Types of participants

Studies were not limited to specific types of participants; however additional analyses were carried out to examine findings for the following policy priority groups:

- underage drinkers (persons under the age of 18),
- young adult binge drinkers (persons aged 18-25, drinking more than the equivalent of 6 UK units (women)/8 UK units (men) on a single occasion)[6]
- harmful drinkers (persons regularly drinking more than the equivalent of 35 UK units per week for women/50 UK units per week for men)[7], and
- those on low incomes

Types of intervention(s)/exposure(s)

The following interventions/exposures were included:

Price:

- Tax increase(s)
- Tax decrease(s)
- Price increase(s)
- Price decrease(s)

Policy:

- Change in coverage of tax policies
- Policies with a direct effect on pricing (e.g. minimum pricing)

Promotion:

- Advertising interventions
- Promotion interventions

Exclusions

Of 10 policy options identified as 'best practices' by Babor et al (2003) the following are excluded from the scope of this review:

> minimum legal purchase age, government monopoly of retail sales, restrictions on hours or days of sale, outlet density restrictions, sobriety checkpoints, lowered BAC limits, administrative licence suspension, graduated licensing for novice drivers and brief interventions for hazardous drinkers.

Types of outcome measure(s)

Consumption:

- Decrease in consumption
- Increase in consumption
- Increased Intention for purchase
- Increased Intention for consumption
- Substitution of one type of alcohol for another
- Substitution of alcohol for another product
- Substitution of another product for alcohol

Health:

- Harmful effects on health
- Health benefit

Social:

[6] It is important to note that the literature reflects a wide range of international definitions of "binge drinking" This review consistently focuses on the accepted definition for the United Kingdom as given above.

[7] Throughout the main report and accompanying summary the review team uses the terminology "harmful drinkers" consistently to represent this category. However where study authors use different terminology e.g. "heavy drinkers" we preserve the original usage by the authors.

- Social harm, including teenage pregnancy, crime, detrimental effects on social cohesion
- Social benefit, including potential positive effects on social capital
- Increased awareness of alcohol advertising

Economic:

- Economic harm
- Economic benefit
- Price elasticity

Methodological quality

The main challenge, as in virtually all studies on policy effects, is to seek to establish a causal link between a change in pricing and/or promotion and the subsequent observations regarding consumption and/or harm. Bradford Hill's principles were used as an aid for examining causation (Macdonald et al, 2005). However, this was to facilitate the quality assessment process rather than to disqualify other types of studies that exist across a wide spectrum of designs and types.

To establish causation one needs to start by trying to establish that the intervention predates the effect (**temporality**). This can be difficult where authors have attempted to correlated two variables in a cross-sectional study design, but the temporality criterion is met in longitudinal, panel and time series analyses. This is the case for econometric studies and the natural experiments described in the review).

Economic theory provides a plausible explanation for how price and promotion changes affect demand (**plausibility**), assuming that such complexities as substitution (of a cheaper and potentially more harmful variant of the product) or cross-product migration (either to other forms of alcohol or to other products such as cigarettes or recreational drugs) are factored into the overall picture. Plausibility also involves the absence of alternative, more plausible, explanations for the observed effects.

Assessments of causal inference also need to consider the **consistency.** This relates to a) the number of studies finding an effect compared with studies reporting no effect or opposite effects, b) the degree to which studies using different designs and methods come to the same conclusion) and c) the degree to which findings can be replicated in different populations and settings. The higher the proportion of studies that point in the same direction, no matter which design and method is used or in which setting they are carried out, the higher the likelihood of a causal relationship.

A further consideration is the **strength** of effects found (the stronger the effect, the more likely it is that there is a direct causal link between two variables).

In addition, there is a criterion of **"biological gradient"** or **dose-response** (i.e. one would expect that, all other things being equal, large price increases would lead to greater reductions in consumption and harm than small ones). If a dose-response relationship is observed, this is considered strong evidence for a causal relationship. However, the absence of a dose-response relationship does not negate a causal relationship, as studies may be covering a too narrow range of observations and encounter a "threshold effect" beyond which no further increases or decreases occur. This may be relevant in particular for the review of advertising effects in the econometric literature. In most developed countries alcohol advertising is highly pervasive and a slight increase or decrease in advertising expenditure may not result in noticeable differences in consumption or harm. In such cases, studies on step-changes, such as complete bans, deliver stronger indications of causal relationships.

A final important criterion is **experiment**. The ideal study type here is the true experiment, with controlled conditions, which allows the highest degree of confidence in establishing causality. However, this type of study is rarely feasible in policy research, especially where population-level policies are concerned. The ways in which this is typically overcome include to choose study designs that reduce bias. The strongest evidence in the field comes from studies which are designed to adequately control for confounders (for example, increases in

personal disposable income) and which examine co-variation over time (as prices increase, consumption decreases and as prices decrease, consumption increases).

There are a number of minor criteria. **Specificity** is often considered the weakest of the listed criteria. Specificity is established when a single putative cause produces a specific effect. However, it is now accepted that most behavioural and disease outcomes (in our case, consumption and harm) are likely to have multiple determinant factors and so it is highly unlikely that there would be one-to-one cause-effect relationship between any of the phenomena under consideration. When specificity of an association is found, it provides additional support for a causal relationship, but its absence does not rule out a causal relationship. **Coherence** considers the degree to which an association fits with existing theory and knowledge. One would demand a higher level of confidence with regard to all other criteria if an assumed new link between two variables contravened what is considered established knowledge. This could for example apply if the review found that the economics of alcohol demand were different to those of other comparable commodities. The **Analogy** criterion is similar in that it asks for an evaluation whether known effects in an analogous area can be transferred to the current area. For example, if it was well-established that children react more strongly to tobacco, sweets and soft drinks advertising compared with adults, this adds weight to a causal interpretation if a similar observation is made for alcoholic drinks.

These methodological considerations should thus be borne in mind when considering the evidence that follows.

Figure 9. QUOROM Flow Diagram – Initial Screen

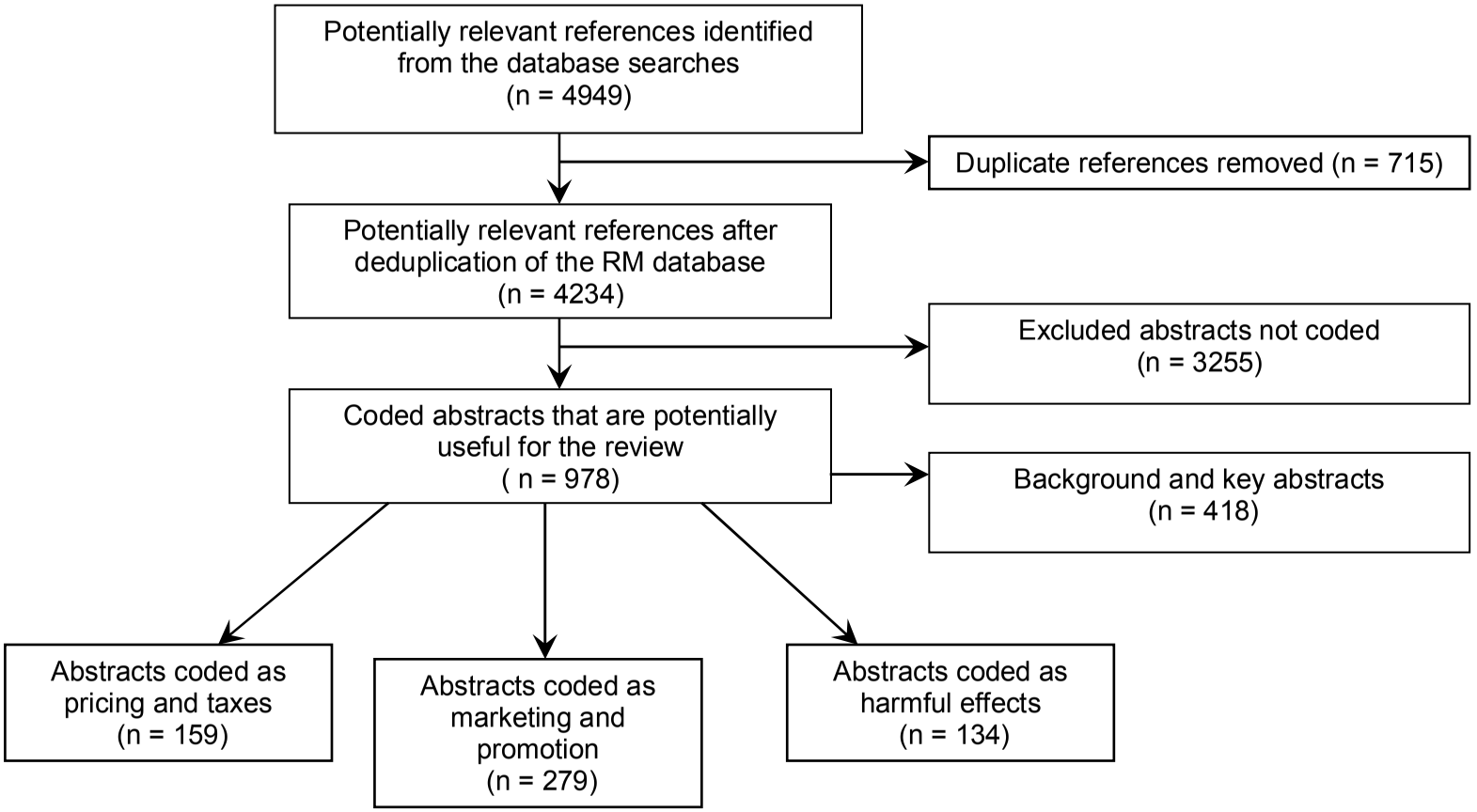


Figure 10. QUOROM flow diagram - Review 1: The effect of pricing and taxation on alcohol consumption

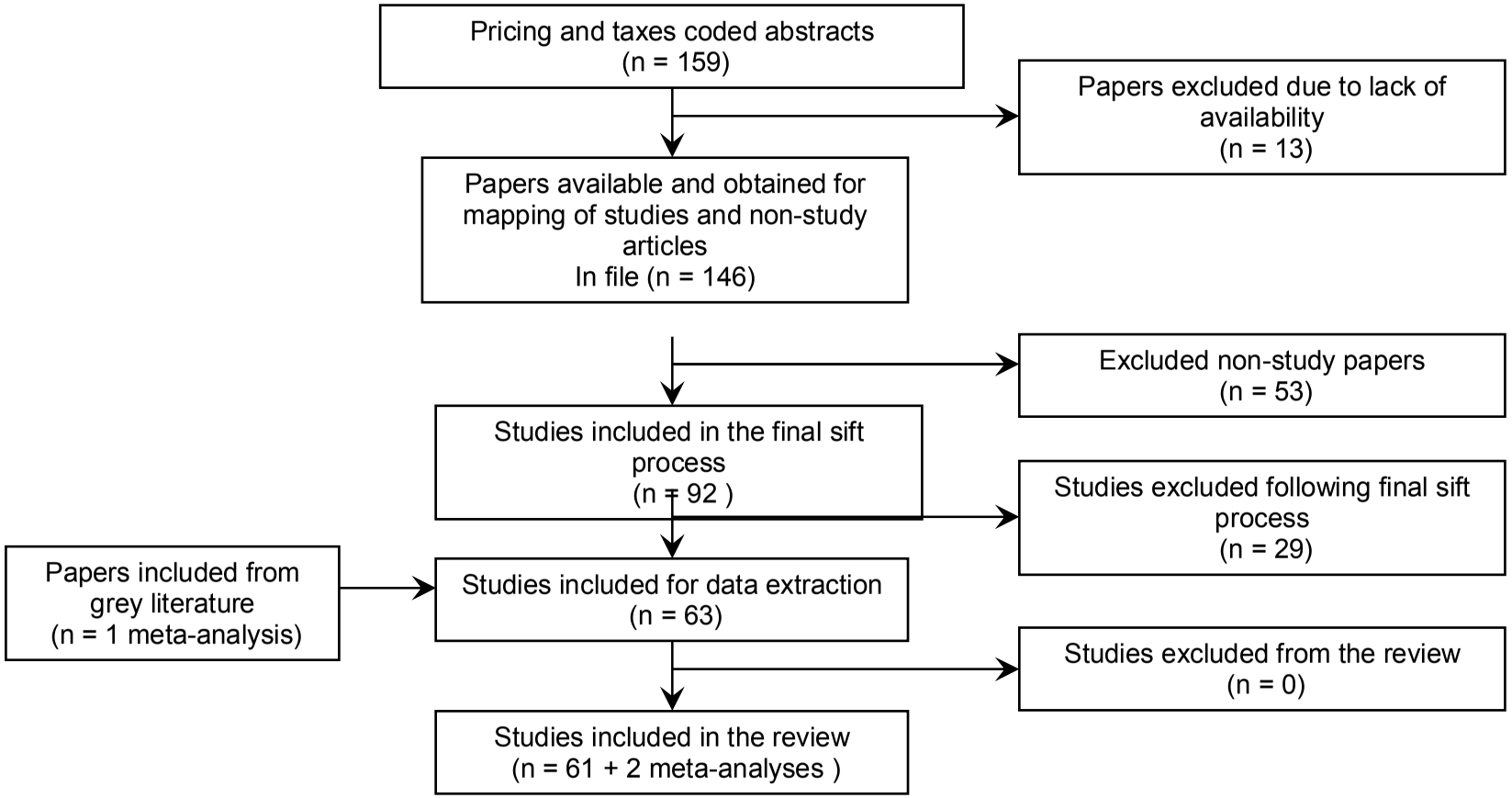


Figure 11. QUOROM flow diagram - Review 2: The effect of promotion on alcohol consumption

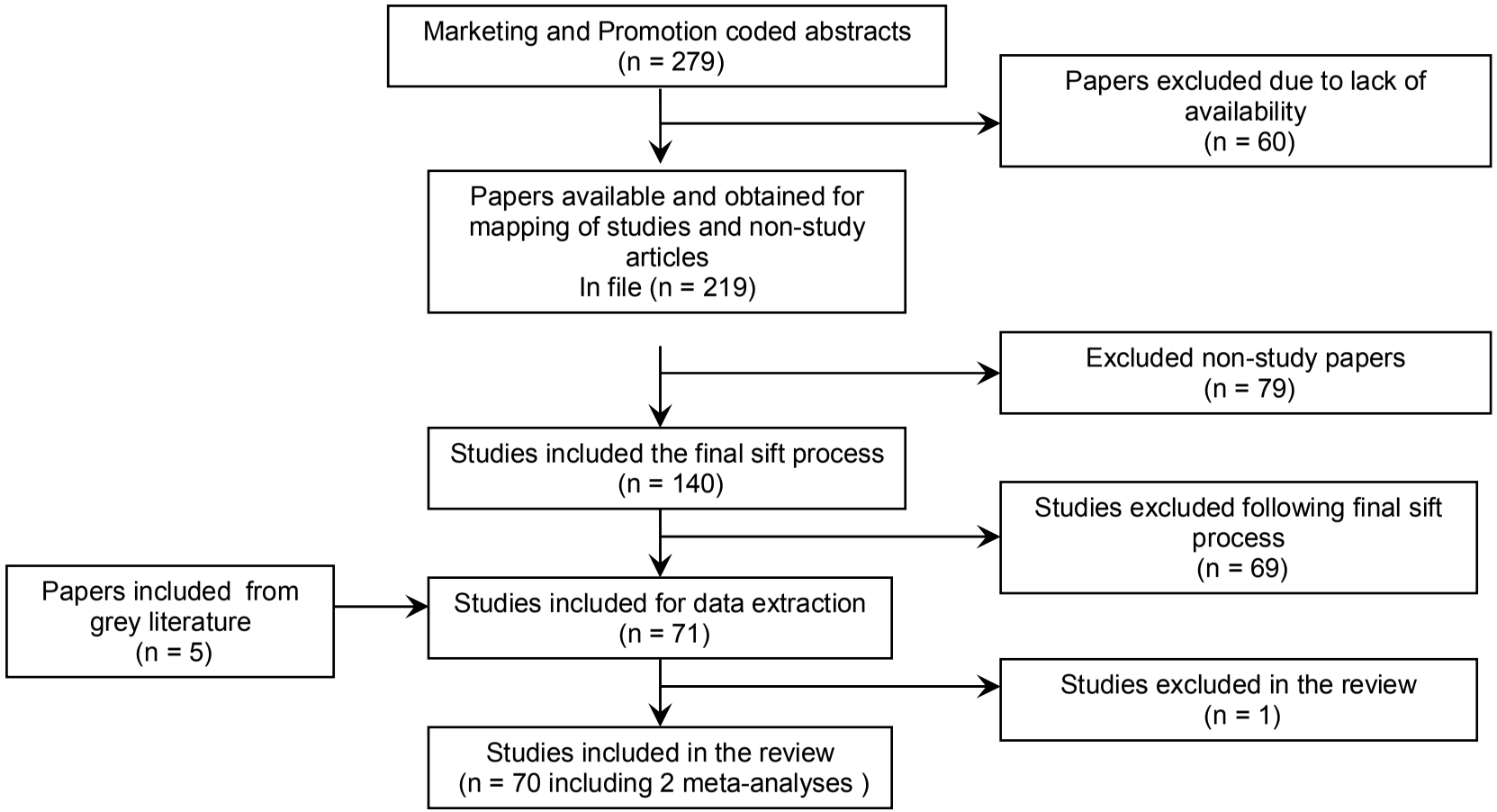
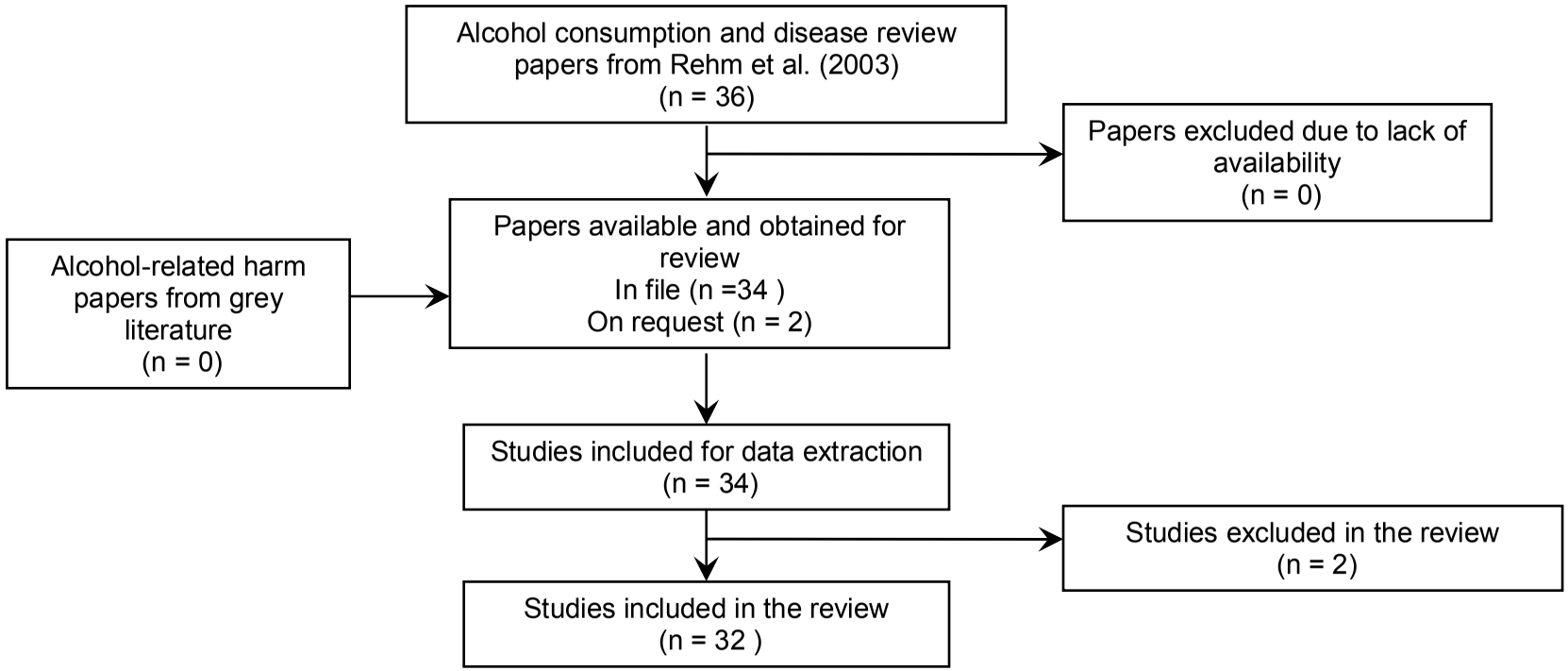


Figure 12. QUOROM flow diagram - Review 3: the effect of alcohol consumption on alcohol related harm



References

Khan, K.S., Ter Riet, G., Glanville, J., Sowden, A.J. & Kleijnen, J. (Eds.) for the NHS Centre for Reviews and Dissemination (CRD) (2001). Undertaking Systematic Reviews of Research on Effectiveness. CRD's Guidance for Carrying Out or Commissioning Reviews. 2nd edition. CRD Report No. 4. York: NHS Centre for Reviews and Dissemination, University of York. (Available at: http://www.york.ac.uk/inst/crd/report4.htm).

Macdonald S, Cherpitel CJ, Borges G, Desouza A, Giesbrecht N, Stockwell T (2005). The criteria for causation of alcohol in violent injuries based on emergency room data from six countries. Addict Behav. 2005 Jan;30(1):103-13.

Review 1: The effect of pricing and taxation on alcohol consumption

1.1 Introduction

In their comprehensive international review, Babor et al (2003) observed that "the regulation of alcohol taxes and prices has been by far the most popular" strategy used to control alcohol related problems. Among the claimed advantages are the generation of governmental income, the relative ease of implementation through legislation and the ease of enforcement.

Babor et al (2003) concluded that: "Economic studies conducted in many developed and some developing regions of the world have demonstrated that increased alcoholic beverage taxes and prices are related to reductions in alcohol use and related problems".

The evidence base for the effect of pricing and taxation comprises two principal sources:

1. Econometric studies that look at co-existing trends between price and consumption or between price and harm.
2. Natural experiments where opportunistic monitoring of changes to alcohol pricing or taxation in a particular country or jurisdiction has identified subsequent changes to patterns of consumption and/or harm. Evidence from these studies is strongest where they are able to report on control jurisdictions, ideally in the same country, where prices/taxes have not changed.

1.1.1 Structure of this review

This review begins by considering studies that link **pricing or taxation to consumption** (Section 1.2), including a small section on minimum pricing policies (1.2.1). It then proceeds to examine studies on the effects of changes in **pricing or taxation on harm** (Section 1.3). Section 1.4 examines the **implications for particular policy priority groups,** followed by a summary of review findings (1.5.).

1.1.2 Summary of quantities of evidence by topic

This review attempts to include both significant primary studies and the results of systematic reviews. The following table reports the respective yield for the major topics covered by this review.

Table 1. Number of included and covered studies

Section	*Number of studies included*	*Number of studies covered*[8]
Pricing/Taxation to Consumption	Gallet meta-analysis (2007)	132
	Wagenaar et al meta-analysis (2008)	91
	15 other studies	15
Taxation/Pricing to Harm	46	46

[8] This includes studies accessed via the results of large meta-analyses or studies that, due to logistic constraints or agreed limitations of the scope of this review (e.g. date, language), are not included in the accompanying evidence tables (See Appendix 3).

1.2 Alcohol prices or taxation and the consumption of alcoholic beverages

The impact of price changes on alcohol consumption has been more extensively investigated than any other potential alcohol policy measure. Frequently such studies take the form of econometric studies examining price elasticity in connection with demand or consumption. The term elasticity is used in econometric studies to measure how much demand for alcohol or alcohol-related harm changes when the price of alcohol changes. A product is described as **price elastic** when the percentage change in demand is greater than the percent change in price. A product is described as **price inelastic** when the percentage change in the amount of demand is less than the percent change in price. All of the following studies consider the relationship between price and alcohol consumption. Two major systematic reviews of price elasticities have been identified by this review.

Gallet (2007) has conducted a meta-analysis of 132 studies reporting elasticities. His meta-analysis is of reasonable quality and is certainly superior to any such analysis possible within the time and resource constraints of these reviews. Gallet's data is therefore used below with special emphasis given to any studies conducted in a UK setting or to those completed subsequent to his data collection.

A new and highly comprehensive meta-analysis has been recently conducted by Wagenaar et al (2008). This review systematically searched nine major scholarly databases of published research material covering health, social, behavioural and economic disciplines for relevant studies enabling numeric estimates to be made of the relationship between price changes and changes in the consumption of alcohol. Inclusion criteria were met by 91 individual studies that cover the relationship between either pricing or taxation and alcohol consumption.

Details of studies
132 studies are included in Gallet's (2007) meta-analysis. All studies were published in English, with the earliest being published in 1945 and the most recent in 2003. The majority of studies were conducted in the USA. An initial search of Econlit was supported by follow up of references from traditional narrative reviews and from included studies and supplemented by internet searches. Price elasticity values were used as the units of analysis. Identification of UK only studies is reported in Appendix 1.

In addition to those included in the meta-analyses, 15 further studies met the inclusion criteria. All studies were published in English, with the earliest being published in 1993. The majority of studies (n=7) were conducted in the USA. Only one study was based specifically in the UK.

Outcomes
Studies measured price elasticity using a variety of methods for specifying alcohol demand. 1172 estimated price elasticities are reported. Most studies examined both own-price and cross-price elasticities.

Results

The price-elasticities for alcoholic beverages estimated in different studies have shown that when other factors remain unchanged, an increase in price has generally led to a decrease in alcohol consumption, and that a decrease in price has usually led to an increase in alcohol consumption, with the size of the elasticities sometimes dependent on the relative presence or absence of other alcohol policy measures (Farrell et al. 2003; Trolldal and Ponicki 2005).

Gallet (2007) reports median price elasticities for Beer (-0.36); Wine (-0.700); Spirits (-0.679) and Alcohol (-0.497). An analysis of annual data from Australia, Canada, Finland, New Zealand, Norway, Sweden, and the United Kingdom from the mid 1950's to the mid 1980's found price elasticities of -0.35 for beer, -0.68 for wine, and -0.98 for spirits (Clements et al. 1997). This means that if the price of beer is raised by 10%, beer consumption would fall by 3.5%; if the price of wine was increased by 10%, wine consumption would fall by 6.8%; and if the price of spirits increased by 10%, spirits consumption would fall by 9.8%. Whilst reported price elasticities are consistently negative, there are differences between countries and within

countries over time, as to the degree to which alcohol consumers react to changes in the price of alcoholic beverages. Even within a given country there may be a significant diversity of price elasticity values cited across studies (Österberg 1995; Chaloupka, Grossman and Saffer 2002). Reviews of demand models from 1989 and 1990 in the United Kingdom found that the demand for beer, wine, and spirits was generally price-inelastic, with the demand for wines and distilled spirits being more responsive to prices than the demand for beer (Godfrey 1989 1990). More recent estimates found price elasticities of -0.48 for beer consumed on premises, -1.03 for beer purchased and consumed off premises, -0.75 for wine, and -1.31 for spirits (Huang 2003).

The standard economic assumption in such studies is that tax changes were passed on to the consumer in equivalent of price changes. This is a conservative estimate as empirical work suggests that a 10% tax increase will usually generate a price increase of between 10 and 20% (Kenkel, 2005; Young and Bielinska-Kwapisz, 2002). Among the 91 studies included in Wagenaar (2008), 74 found a significant negative relationship between taxation or prices and consumption with an overall elasticity estimate of -0.51. Mean elasticities for specific beverages were -0.46 for beer (105 studies), -0.69 for wine (93 studies) and -0.80 for spirits (103 studies). The meta-analysis found significant relationships ($p<.001$) between alcohol tax or price measures and indices of sales or consumption of alcohol (r = -0.17 for beer, -0.30 for wine, -0.29 for spirits, and -0.44 for total alcohol). Significant effects were also found for alcohol prices on heavy drinking, although the effect sizes were smaller than for overall drinking (Wagenaar et al, 2008). Wagenaar's estimates are quite similar to those from another recently published analysis (Gallet, 2007) who reported median price elasticities for wine (-0.70), spirits (-0.68) and all alcoholic beverages (-0.50), but a slightly higher elasticity for beer (-0.36). The latter study included over 1000 estimates from studies conducted since 1945.

Natural experiments have demonstrated that increases or decreases in price are likely to be associated with sharp decreases or increases respectively in per capita alcohol consumption (Bruun et al, 1975; Cook 1981; Cook & Moore 1993; Chaloupka et al 1993; Godfrey 1997). For example a study from New Zealand by Zhang and Casswell (1999) found beer consumption declined with an increase in real price during the early 1990s. Conversely an increase in wine consumption during the same period was party attributable to a decrease in the real price of wine.

Another natural experiment occurred in Switzerland with its reform of spirits taxes, which came into effect on 1 July 1999. Previously, the tax rate per litre of pure alcohol for domestic spirits was Swiss francs 26.00 and for foreign spirits between Swiss francs 32.00 and 58.00, according to the type of beverage and its alcohol content. The fiscal reform also liberalized the import of spirits. The result was a reduction of between 30% and 50% in the retail price of foreign spirits. Prices of domestic spirits, however, did not change. Spirits consumption increased significantly (by 28.6%) in the total sample, and specifically in young males and in individuals who were low-volume drinkers at baseline (Heeb et al. 2003). Consumption of alcohol overall, or of wine or beer, did not change significantly. No indication of effects of substitution was found. Alcohol-related problems also increased significantly; an effect that disappeared when spirits consumption was controlled for. This suggests that the increase in alcohol-related problems at follow-up was directly associated with increased consumption of spirits.

Kuo et al (2003) demonstrates that younger people are particularly likely to be affected by price and several other studies show that the price of beer is a significant factor when targeting young people, especially young males.

Changes in alcohol consumption are not only determined by changes in price, but also by changes in income. Therefore, measures that ensure that taxation or pricing increases match or exceed that of rises in personal disposable income (Laixuthai & Chaloupka, 1993) can be expected to be more effective.

Limitations

Individual authors have argued that to some degree, levels of taxation may reflect the characteristics of the wider environment. In a cross-sectional study, Dee (1999) explored variables other than price (such as anti-alcohol sentiment) as an explanation for effects of varying alcohol taxes. Having taken this potential confounding variable into account, the effect of taxes on drinking levels disappeared, leading the author to the conclusion that taxation may therefore simply reflect the presence of an anti-alcohol environment. However, taxation changes are typically prompted by economic rather than public health considerations, and Dee's study cannot explain findings of many natural experiments of tax changes in the same country, where it is highly unlikely that an "overnight change" of anti-alcohol sentiment has taken place.

Summary

Collectively, these studies span dozens of countries and many decades of experience of the relationship between alcohol prices and consumption. The effects of price changes on alcohol consumption are significant and of a substantially larger size than other alcohol policy interventions (Babor et al, 2003). There is, however, substantial variation in the size of the relationship, although it is consistently negative, i.e. in the direction of reduced consumption as prices increase. Estimates of price elasticities vary by beverage type, country, population group (e.g. age of consumer) and quality of product (Stockwell and Gruenewald, 2003). This should not be surprising as "alcohol" is not one product. Alcohol markets in developed countries typically include many thousands of different products arranged upon a spectrum of price and quality (Ponicki et al 1997, Stockwell and Crosbie, 2001).

Drinkers who have access to a large supply of cheap alcohol are likely to drink both more regularly and to consume a greater amount of alcohol overall (Chaloupka et al, 2002). Consistent with this, studies have reported that increasing the price of alcohol reduces heavy drinking (Coate and Grossman 1988; Kenkel 1993 1996; Manning et al. 1995), as well as alcohol dependence (Farrell et al. 2003).

There is strong evidence that hazardous drinkers tend to choose cheaper drinks, whether they are young binge drinkers (Wechsler et al, 2000) or problem drinkers (Stockwell, 2000). In addition in most developed countries approximately 20% of drinkers consume approximately 80% of all alcohol sold (e.g. Stockwell et al, Personal Communication) and this has been shown to be similar in the UK using data from the English General Household Survey (see Introduction). Influencing the prices of the cheapest drinks on the market by raising "floor prices" has a larger impact on total consumption than does increasing the prices of more expensive drinks (Gruenewald, 2000). Using the empirical results obtained in their study of the Swedish alcohol monopoly from 1984 to 1993, the authors predicted the impact of a 10% increase in average beverage prices on sales under three scenarios: a flat price increase across *all beverages* led to a 1.7% drop in sales, a price increase affecting mainly *higher quality beverages* led to a 2.8% increase in sales, and a price increase affecting *lower quality beverages* led to a 4.2% drop in alcohol sales (Gruenewald & Treno 2000). For public health and safety purposes, it is therefore important to think about the structuring of alcohol taxes across all alcoholic products and not just average tax rates.

In terms of the policy priority groups, studies have found that increases in the price of alcohol reduce the alcohol consumption of young people, with a greater impact on more frequent and heavier drinkers than on less frequent and lighter drinkers (Laixuthai and Chaloupka 1993; Chaloupka and Wechsler 1996; Cook and Moore 2002). Beyond levels of drinking, price has also been found to influence drinking to intoxication, which is associated with the highest levels of acute harm. One large survey in the USA found that a 10% increase in price would decrease the number of intoxication episodes per month by 8% (defined as consuming 5+ drinks on one occasion; Sloan et al. 1995).

Evidence statement 1: There is strong and consistent evidence to suggest that price increases (including through taxation) have a significant effect in reducing demand for alcohol. The evidence base is derived from studies from four different countries (USA,

Australia, Switzerland and the UK) and uses a variety of study designs and methodologies.

Evidence statement 2: There is strong evidence to suggest that young drinkers, binge drinkers and harmful drinkers tend to choose cheaper drinks. Low income groups have not been studied specifically.

1.2.1 Minimum pricing

Increasingly retailers such as supermarkets use discounting of alcohol products at low prices, or even below cost, to attract customers to buy other more profitable goods. While such staples as bread have been used in this way for many years there is growing concern that this is being used extensively for alcohol which is an addictive good with known harmful health and social consequences. Minimum pricing policies attempt to counter practices "in which retailers set very low prices, sometimes below cost, for some products to lure customers into stores" (Hess and Gerstner, 1987). Loss leaders are typically heavily advertised.

Details of studies

In countries where central governmental control does not restrict minimum pricing, local restrictions have sometimes been used to exercise this control on the sale of very cheap beverages (e.g. where cheap wines caused substantial problems in rural Australian communities with a high Aboriginal population, Gray et al, 2000).

Results

In an evaluation of the Tennant Creek (Aus.) initiative Gray and colleagues (2000) found that over the two years following the introduction of such the restrictions, there was a reduction of 19.4% in annual per capita consumption of pure alcohol. This was accompanied by declines in hospital admissions for acute alcohol-related diagnostic related groups; and persons taken into police custody and the proportions of offences reported on Thursdays, when government subsistence payments were paid. Furthermore, most survey respondents favoured retention or strengthening the existing restrictions.

Limitations

Some critics argue that from an economic point of view minimum pricing may have a reverse effect than that which is desired, i.e. that by guaranteeing an expected price, manufacturers may be provided with an incentive for increased production. This argument is unlikely to be true, since it is demand that drives production of products at a certain price. From a public health viewpoint, however, a minimum pricing policy appears to make sense by reducing consumption (within elasticities discussed above) and thus reducing the harmful health and social consequences.

Summary

Gray and colleagues conclude that minimum pricing strategies may constitute an effective part of a broad public health strategy to deal with alcohol-related problems. There is also evidence, reviewed below, that heavy and problem drinkers are more likely to select cheaper alcohol products - it follows that raising floor prices will have a disproportionate effect on those drinkers at most risk of harm.

Evidence statement 3: There is low quality but demonstrable specific evidence to suggest that minimum pricing might be effective as a targeted public health policy in reducing consumption of cheap drinks. There is also evidence to suggest that such a policy may be acceptable to many members of the community. Further research is required to validate these findings for UK populations and for policy priority groups.

1.3 Taxation or pricing studies linked to harm

Although conceptually there is a difference between taxation increases (where revenue is directed to the taxation authority) and price increases (where additional income may be

channelled in the form of additional profits to the producer) there is an overlapping evidence base in that the putative mechanism of deterrence (and hence harm reduction) is common to both. This set of studies attempts either to establish a link between changes in taxation and subsequent changes in alcohol-attributable harm or between changes in pricing and subsequent changes in harm. A narrative synthesis is preferred here because of the heterogeneity of studies in this sample. However, for ease of identification the tables for the two sets of studies are kept separate. No systematic reviews of the effects on harm of either taxation or pricing changes were found.

Details of studies
24 studies met the inclusion criteria for taxation studies. All studies were published in English, with the earliest being published in 1993. The majority of the studies were conducted in the USA. No studies exclusively examined policy priority groups although several studies included subsets of data examining impact on binge drinkers or harmful drinkers.

22 studies met the inclusion criteria for pricing studies. All studies were published in English, with the earliest being published in 1998. A large majority of studies were conducted in the USA. While most of the studies examined effects on the general population several looked for effects on heavier drinkers. In addition some of the outcome measures (e.g. number of traffic accidents) were chosen because they possess a high alcohol-attributable fraction and therefore are more likely to reflect the behaviours of at risk groups.

Outcomes
Outcomes varied according to the exposure of interest e.g. sexually transmitted diseases were determined by incidence rates and traffic accidents by fatality rates. Outcomes also included robbery, assault and sexual assault, and injuries.

Results
There is a clear indication for a link between tax and the harm attributable to alcohol in the majority of identified studies. Chisholm et al (2004) remark that, on the basis of their modelling, in a population with a higher prevalence of heavy drinkers (i.e. more than 5% as is the case in Britain) the most effective and cost-effective intervention was taxation whereas in populations with a lower prevalence advertising bans are more effective than taxation, although the underlying evidence base for this observation does not appear strong.

Increasing the price of alcohol and beer reduces road traffic accidents and fatalities among people of all ages, but particularly for younger drivers (Kenkel 1993; Ruhm 1996 Chaloupka and Laixuthai 1997 Dee 1999; Mast et al. 1999; Dee and Evans 2001; Chaloupka et al. 2002 Saffer and Chaloupka 1989; Evans et al. 1991; Chaloupka et al. 1993; Sloan et al. 1994a; Mullahy and Sindelar 1994a). On the basis of such studies, it has been estimated that a policy adjusting the USA beer tax for the inflation rate since 1951 to the mid-1980s would have reduced total road traffic fatalities by 11.5 percent and fatalities among 18- to 20-year-olds by 32.1 percent (Chaloupka et al. 1993).

Increases in alcohol prices reduce cirrhosis death rates (Grossman 1993; Cook and Tauchen 1982), intentional and unintentional injuries (Sloan et al. 1994; Grossman and Markowitz 1999), workplace injuries (Ohsfeldt and Morrisey 1997) and sexually transmitted disease rates (Chesson et al. 2000).

Higher beer prices have been shown to lead to reductions in rapes and robberies (Cook and Moore 1993), homicides (Sloan et al. 1994), crime (Saffer 2001), child abuse (Markowitz and Grossman 1998; Markowitz and Grossman 2000), wife abuse (Markowitz 2000), violence at universities (Grossman and Markowitz 2001), and violence-related injuries (Matthews et al. 2005).

In the United Kingdom, it has been estimated that a 10% rise in the prices of alcoholic beverages would lead to a drop of 7.0% in male and 8.3% in female cirrhosis mortality, a drop of 5.0% for male victims and 7.1% for female victims of homicide, and a drop of 28.8% for male and 37.4% for female deaths from explicitly alcohol-involved causes (alcohol dependence, poisoning, etc.) (Academy of Medical Sciences 2004).

Numerous studies investigate whether there are direct effects of changes in price and/or taxation on indices of alcohol-related harm. While it is assumed that those effects which are found are due to mediating effects on volume or pattern (including location) of alcohol consumption, the outcome variable of most interest in these studies tends to be alcohol-related harms such as rates of liver cirrhosis, road trauma or sexually transmitted disease.

An Australian study evaluated the public health impact of a rare policy event: an increase in alcohol taxes in one jurisdiction which was later reversed (Chikritzhs et al, 2005). It was found that an increase in tax on drinks with an alcohol content above 3% alcohol by volume in the Northern Territory in 1992 significantly reduced acute but not chronic alcohol caused mortality in comparison with adjacent areas of Western Australia and Queensland. Other international studies have also found associations between tax changes and harms including: acute deaths in Finland (Koski et al, 2007), small effects on deaths from all causes in the USA (Cook et al, 2005), male suicides in the USA (Markowitz et al, 2003), assaults in the USA (Markowitz et al, 2005), male sexually transmitted diseases (Carpenter, 2005) and unwanted pregnancies (Sen et al, 2003).

Limitations

These studies are valuable as they examine the link likely to be most useful for decision-makers i.e. between the policy or pricing decision and subsequent harm. Many of these studies describe associations between alcohol prices and harm variables using time series data, but not all include comparisons with control states/jurisdictions where changes have not been implemented or control for confounders. Some of the strongest studies include multiple jurisdictions in the same country which permit comparisons of different tax and price levels for alcohol beverages in an otherwise very similar setting, and which varied to differing degrees over the periods studied. One such example is a study concerning the impacts of alcohol tax changes and minimum age purchase laws on road trauma across 48 USA states, finding significant negative associations suggesting increased prices reduce alcohol-related road trauma (Ponicki et al, 2007).

Summary

Most studies examine correlations between two independent datasets - those measuring the exposure (alcohol taxation or alcohol pricing) and those measuring the putative outcome (harm). There is a need to differentiate between acute and chronic harms, where one would expect immediate effects on acute harms such as from drink driving. There is some discussion about the importance of time lags for chronic harms (e.g. liver disease), but the preponderance of evidence points to both immediate and somewhat delayed effects.

Evidence statement 4: A large number of studies consistently suggest evidence for an association between increases in taxation or pricing of alcohol and reductions in harm.

1.4 Implications for particular policy priority groups

Underage drinkers

It is suggested in the literature that youth may be especially sensitive to price because they often have little money of their own, and those who drink heavily may not yet be addicted or may not be so addicted that they become less responsive to price changes. A recent UK study found a strong relationship between teenagers' disposable income and their likelihood of binge drinking (Bellis et al 2007).

Laixuthai and Chaloupka (1993) found that raising beer prices through taxation would cut both the overall number of young drinkers and the number of those who drink heavily. Higher beer prices were found to significantly reduce the likelihood for drinking, drinking frequency and binge drinking in underage and adult female drinkers (but not male drinkers, Chaloupka & Wechsler, 1996).

Binge drinkers aged 18-24

As with others of our interest groups young binge drinkers tend to choose cheaper drinks (Wechsler et al, 2000). One study found that modest increases in levels of taxes have no effect on the number of drinks consumed or on binge drinking (6 or more drinks on one occasion) (Gius, 2002) but as this was in an over 29 age group it is problematic to extrapolate to a markedly younger population. Furthermore this was an isolated finding and certainly conflicts with much of the evidence identified for this review. Chaloupka and Wechsler (1996) used a questionnaire approach to explore likely reactions to a tenfold increase in the tax on beer and found it would reduce binge drinking by young women by about 20%, but would have no effect on young men. However the researchers attributed the small impact on women and lack of effect on men to measurement error. A substantial tax increase is thus required to achieve modest reductions in binge drinking by female students (Chaloupka and Wechsler, 1996). Keng & Huffman 2007 found that binge drinking by young people is highly responsive to state taxes on alcohol. They conclude that an increase in local alcohol price decreases the occasions of binge drinking, and thus the individual is less likely to become a binge drinker (Keng & Huffman 2007).

A positive relationship has been found between alcohol availability and drinking and binge drinking (Chaloupka and Wechsler, 1996). Other important factors identified empirically are type of drink (with students drinking beer, liquor or no preferred type being more likely to binge than those who drank wine (Wechsler et al 2000) and promotions (with students who were paying less per drink or who received drinks for a set price also being more likely to binge (Wechsler et al, 2000)). This same study found that males were more likely to binge drink than female students (50% vs 41%) (Wechsler et al 2000). It should be noted that these findings date from the year 2000 in the United States. Contemporary UK trends suggest that some of these patterns may be changing, if they have not already changed. Finally, Okoro, et al (2004) found a link between frequent binge drinking and negative health related quality of life. They suggest that increases in alcohol excise taxes are an effective public health measure to reduce binge drinking.

Low income

No specific evidence was identified on effects of price or taxation on those with a low income. A tax increase sufficient to reduce physical and other consequences of drinking may improve the nation's health and (to the extent that persons with a positive score on this factor impose costs on others) increase its economic efficiency. But it will also reduce the economic well-being of drinkers who continue to regularly consume alcohol, since evidence from the meta-analyses of price elasticities suggests that alcohol has considerable price inelasticity. A study that predates the scope of this review found that when income falls so does alcohol consumption (Adrian & Ferguson, 1986).

Harmful drinkers

Laixuthai and Chaloupka (1993) looked specifically at how price would affect heavy drinking. Given a model of addiction one might suppose that heaviest drinkers should be least affected by price. However some studies have found that heavy drinkers may be more affected by increased prices than moderate or occasional drinkers. This could be explained, at least in part, by the idea that when consuming large quantities as a necessity, a small price increase has a larger effect but when drinking occasionally as a luxury or "treat," price is less important. The study found that raising beer prices through taxation would cut both the overall number of young drinkers and the number of those who drink heavily. Other studies have come to similar conclusions. Research suggesting that price affects consumption even amongst addicts runs across the addictions field (including tobacco) (Manning & Finch, 2003). Wagenaar (2008) found in his meta-analysis that price/tax also significantly affects heavy drinking ($p<.01$), but the magnitude of effect is smaller than effects on overall drinking.

Chisholm et al's (2004) modelling work projected that in populations with high prevalence of heavy drinkers (more than 5%) [e.g. Europe and North America] taxation was both the most effective and cost-effective intervention. Beer taxes have a small impact on consumption and heavy drinkers are the least responsive to price (Mast et al, 1999). Coate & Grossman (1988) found that fractions of fairly heavy (3-5 cans) and heavy drinkers (6+ cans) declined more in

both absolute and percentage terms than did fraction of light drinkers (1-2 cans) in response to price increases. Laixuthai & Chaloupka (1993) suggested that increasing beer taxation and/or increasing MLDA reduce youth's frequency of alcohol consumption and their heavy drinking. Increasing taxation on alcohol to keep pace with inflation would lead to a 19% reduction in heavy drinking by youths and 6% reduction in high-risk drinking. Finally, Cook and Tauchen (1982) in a study predating the coverage of this review, found that higher alcohol taxes reduce death rates from cirrhosis (presumably occurring primarily amongst alcoholics) more than they reduce consumption in general.

1.5 Summary

An increase in the price of alcohol has been found to reduce alcohol consumption, hazardous and harmful alcohol consumption, alcohol dependence, the harm done by alcohol, and the harm done by alcohol to others than the drinker. Policies that regulate the alcohol market, including the price of alcohol, the location, density, and opening hours of sales outlets and controls on the availability of alcohol have been found to have an impact in reducing drinking and driving and related fatalities (Grube and Stewart 2004). The exact size of this impact varied between countries and a major limitation of the evidence base is that most studies examining the impact of such policies have been conducted in the United States. Nevertheless, there is very strong evidence for the effectiveness of alcohol taxes in targeting young people, heavy drinkers and the harmful effects of alcohol.

Possible policies:

- Increase alcohol duty and link alcohol taxes to inflation (cf Anderson and Baumberg 2006).
- Link levels of taxation to alcohol strength, including introduction of tax incentives for low-alcohol alternatives
- Minimum pricing
- Policies targeting price-based promotions

This review has examined the evidence base on the influence of price and price changes on alcohol consumption and harm. It has found evidence of a clear relationship that taxation or price increases serve to decrease consumption and associated harms. A potential collateral impact of policies leading to large price rises in terms of stimulation of a covert, illegal trade that needs to be borne in mind.

Rigorous efforts were taken to identify research studies or evaluations examining price-based promotions in the off-trade. While there is little empirical research investigating minimum pricing the putative mechanisms for this as a public health policy are clearly associated with the wider taxation and pricing evidence base. There is scattered evidence that suggests that the various pricing policy options have a similar or stronger effect for the identified at-risk groups (young people under 18, young adult binge drinkers, and, in some studies, heavy drinkers) and may thus be especially suitable for reducing overall harms in these groups.

1.6 References: Review 1

Academy of Medical Sciences. (2004) *Calling time: the nation's drinking as a major health issue.* London: Academy of Medical Sciences.

Adrian M & Ferguson B.S. (1986). Influence of income on the consumption of alcohol in Ontario: A cross- section study. In: A. Carmi and S. Schneider, Eds., *Drugs and Alcohol,* New York, NY: Springer-Verlag,. 220 p. (pp. 151-157)

Anderson P & Baumberg B. (2006). *Alcohol in Europe: a public health perspective*. Institute of Alcohol Studies, London.

Babor, TF., Caetano, R., Casswell, S., Edwards, G., Giesbrecht, N., Graham, K., Grube, J., Gruenewald, P., Hill, L., Holder, H., Homel, R., Osterberg, E., Rehm, J., Room, R and Rossow, I. (2003). *Alcohol: No Ordinary Commodity. Research and Public Policy.* Oxford University Press.

Bellis MA, Hughes K, Morleo M et al. (2007). Predictors of risky alcohol consumption in schoolchildren and their implications for preventing alcohol-related harm. *Subst Abuse Treat Prev Policy*. **2**:15.

Bruun, K., Edwards, G., Lumio, M., Mäkelä, K., Pan, L., Popham, R.E., Room, R., Schmidt, W., Skog, O.-J., Sulkunen, P. and Österberg, E. (1975) *Alcohol Control Policies in Public Health Perspective.* Helsinki: Finnish Foundation for Alcohol Studies, Volume 25.

Coate, D., & Grossman, M. (1988). Effects of alcoholic beverage prices and legal drinking ages on youth alcohol use. *Journal of Law and Economics* **31**(1):145-171

Cook, PJ (1981). The effect of liquor taxes on drinking, cirrhosis, and auto accidents. *Alcohol and public policy: beyond the shadow of Prohibition*. Mark H. Moore and Dean R. Gerstein eds. Washington DC: National Academy Press. (pp. 255-285).

Cook P.J. & Moore, M.J. (1993) *Taxation of alcoholic beverages. Economics and the Prevention of Alcohol-Related Problems.* National Institute of Alcohol Abuse and Alcoholism, Rockville, MD.

Cook, P.J. & Moore, M.J. (2002). The economics of alcohol abuse and alcohol control policies. Health Affairs, **21** 120-133.

Cook PJ & Tauchen G, (1982). The Effect of Liquor Taxes on Heavy Drinking, *Bell Journal of Economics*, The RAND Corporation, **13**(2), 379-390.

Dee, T.S., and Evans, W.N (2001). Teens and traffic safety. In: Gruber, J., ed. *Risky Behavior Among Youth: An Economic Perspective*. Chicago: University of Chicago Press, 121–165.

Evans,W.N., Neville, D., Graham, J.D., (1991). General deterrence of drunk driving: evaluation of recent American policies. *Risk Analysis* **11**, 279–289.

Godfrey C. (1989) Factors influencing the consumption of alcohol and tobacco: the use and abuse of economic models. *British Journal of Addiction*, **84**, 1123-1138.

Godfrey C. (1990) Modelling demand. In *Preventing alcohol and tobacco problems*, (A Maynard and P. Tether, Eds), (pp. 35-53). Avebury, Aldershot.

Godfrey, C. (1997). Can tax be used to minimise harm? A health economist's perspective. In: M. A. Plant, E. Single, & T. Stockwell (Eds), *Alcohol: Minimising the harm: What works?* (pp. 29–42). London: Free Association Books.

Gray, D., Saggers, S., Atkinson, D., Sputore, B. and Bourbon, D. (2000). Beating the grog: an evaluation of the Tennant Creek liquor licensing restrictions. *Australian and New Zealand Journal of Public Health*; **24**(1):39-44

Grossman, M. (1993). The economic analysis of addictive behavior. In: Hilton, M.E., and Bloss, G.,eds. *Economics and the Prevention of Alcohol-Related Problems.* NIAAA Research Monograph No. 25, NIH Pub. No. 93–3513. Bethesda, MD: National Institute on Alcohol Abuse and Alcoholism, (pp. 91–123).

Grossman, M., Markowitz, S., (1999). *Alcohol Regulation and Violence on College Campuses.* Working Paper 7129, National Bureau of Economic Research, Cambridge, MA.

Grube JW; Stewart K (2004) Preventing impaired driving using alcohol policy. *Traffic Inj Prev*;**5**(3):199-207.

Gruenewald, PJ (2000) The epiphenomena of beverage-specific effects *Addiction*, **95**, (3), 347-358.

Gruenewald PJ & Treno AJ (2000)Local and global alcohol supply: Economic and geographic models of community systems *Addiction*, **95**, (Supplement 4), S537-S549.

Hess, J, and Gerstner, E. (1987) Loss Leader Pricing and Rain Check Policy, *Marketing Science*, **6** (4) 1987, 358-374.

Kenkel, D.S. (1996)New estimates of the optimal tax on alcohol. *Economic Inquiry* **34**(2):296–319.

Kenkel D.S. (2005). Are alcohol tax hikes fully passed through to prices? Evidence from Alaska. *American Economic Review*. **95**(2):273-7.

Manning WG, Finch MD. (2003). Alcohol dependence and the price of alcoholic beverages. J *Health Econ*. Jan;**22**(1):117-47.

Markowitz, S. And Grossman, M. (2000) The effects of beer taxes on physical child abuse. *Journal of Health Economics* **19**(2):271–282.

Markowitz, S., Kaestner, R., and Grossman, M. (2005). An investigation of the effects of alcohol consumption and alcohol policies on youth risky sexual behaviors. The *American Economic Review*, **95**:263–266.

Matthews, K., Shepherd, J. and Sivarajasingham, V. (2006). The price of beer and violence-related injury in England and Wales. *Injury* **37**:388-394

Okoro, C. A., Brewer, R. D., Naimi, T. S., Moriarty, D. G., Giles, W. H., & Mokdad, A. H. (2004). Binge drinking and health-related quality of life: Do popular perceptions match reality? *American Journal of Preventive Medicine*, **26**, 230–233.

Österberg E (1995). Do alcohol prices affect consumption and related problems? In: Holder H, Edwards G, eds. *Alcohol and public policy. Evidence and issues.* Oxford University Press:145-163.

Ponicki, W., Holder, H., Gruenewald, P. and Romelsjo, A. (1997). Altering alcohol price by ethanol content: results from a Swedish tax policy in 1992. *Addiction* **92:** 859-870.

Saffer, H., and Chaloupka, F.J. (1989). Breath Testing and Highway Fatality Rates. *Applied Economics* **21**(7): 901-912.

Stockwell, T.R. (2000). *Acute alcohol-related harm in Australia: what do we know and what do we need to know?* A discussion paper prepared for the National Workshop on Alcohol Research Priorities. A report commissioned by the Commonwealth.

Stockwell, T.R. and Crosbie, D. (2001). Supply and demand for alcohol in Australia: relationships between industry structures, regulation and the marketplace. *International Journal of Drug Policy*. **12**(2), 139-152.

Stockwell, T., & Gruenewald, P (2003). Controls on the physical availability of alcohol. In: *International handbook of alcohol dependence and problems.* Heather, N., Peters, T.J., and Stockwell, T. (Eds). (pp. 699 – 718).

Stockwell T.R. et al, Personal Communication.

Young DJ & Bielinska-Kwapisz A. (2002). Alcohol taxes and beverage prices. *National Tax Journal*. **55**:57-73.

1.7 Included studies: Review 1

Adrian, M., Ferguson, B. S., & Her, M., (2001). Can alcohol price policies be used to reduce drunk driving? Evidence from Canada, *Substance Use & Misuse*, **36**, (13), 1923-1957.

Baker, T. K., Johnson, M. B., Voas, R. B., & Lange, J. E. (2000), To reduce youthful binge drinking: Call an election in Mexico, *Journal of Safety Research*, **31**, 2, 61-69.

Bradizza, C. M., Collins, R. L., Vincent, P. C., & Falco, D. L. (2006), It does the job: Young adults discuss their malt liquor consumption*., Addictive Behaviors*, **31**, 9, 1559-1577.

Cameron, L. & Williams, J., (2001) Cannabis, Alcohol and Cigarettes: Substitutes or Complements?, *Economic Record*,. **77**, 236, p. 19.

Chaloupka, F. J., Saffer, H., & Grossman, M. (1993), Alcohol-control policies and motor-vehicle fatalities, *Journal of Legal Studies*, **22**, 161-186.

Chaloupka, F. J. & Wechsler, H. (1996), Binge drinking in college: the impact of price, availability, and alcohol control policies, *Contemporary Economic Policy*, **14**, 4, 112-124.

Chaloupka F.J., Grossman M., and Saffer H. (2002) The effects of price on alcohol consumption and alcohol-related problems. *Alcohol research and Health* **26**, 22-34.

Chen, M. J., Paschall, M. J., & Grube, J. W. (2006), Motives for malt liquor consumption in a sample of community college students. , *Addictive Behaviors*, **31**, 8, 1295-1307.

Chesson, H., Harrison, P., & Kassler, W. (2000), Sex Under the Influence: The Effect of Alcohol Policy on Sexually Transmitted Disease Rates in the United States, *Journal of Law and Economics*, **43**, 1, 215-238.

Chikritzhs, T., Stockwell, T., and Pascal, R. (2005) The impact of the Northern Territory's Living With Alcohol Program, 1992-2002: revisiting the evaluation. *Addiction*, **100**, 1625-1636.

Chisholm, D., Monteiro, M., Ommeren, M. V., & Rehm, J. (2004), Reducing the global burden of hazardous alcohol use: a comparative cost-effectiveness analysis, Journal of Studies on Alcohol; **65** (6), 782-793.

Clements, K. W., Yang, W., & Zheng, S. W. (1997), Is utility addictive? The case of alcohol, *Applied Economics*, **29**, 1163-1167.

Cook, P. J. Ostermann J, and Sloan FA (2005), The Net Effect of an Alcohol Tax Increase on Death Rates in Middle Age, *American Economic Review*, **95**, (2), 278-281.

Costanigro, M., McCluskey, J. J., & Mittelhammer, R. C. (2007), Segmenting the wine market based on price: Hedonic regression when different prices mean different products, *Journal of Agricultural Economics*, **58**, 3, 454-466.

Dave, D. & Kaestner, R. 2002, Alcohol taxes and labor market outcomes, *Journal of Health Economics*, **21**, 3, 357-371.

Decker, S. L. and Schwartz, AE (2000), *Cigarettes and Alcohol: Substitutes or Complements?,* National Bureau of Economic Research, Inc, NBER Working Papers: 7535.

Dee, T.S. (1999) State alcohol policies, teen drinking and traffic accidents. *Journal of Public Economics* **72**(2): 289-315.

Farrell, S., Manning, W. G., & Finch, M. D. (2003), Alcohol dependence and the price of alcoholic beverages, *Journal of Health Economics*, **22**, 1, 117-147.

Freeman, D. G. (2000), Alternative Panel Estimates of Alcohol Demand, Taxation, and the Business Cycle, *Southern Economic Journal*, 67, 2, 325-344.

Gallet, C. A. (2007), The Demand for Alcohol: A Meta-analysis of Elasticities, Australian *Journal of Agricultural and Resource Economics*, **51**, 2, 121-135.

Gius, M. P. (2002), The Effect of Taxes on Alcoholic Consumption: An Individual Level of Analysis with a Correction for Aggregate Public Policy Variables, *Pennsylvania Economic Review*, **11**, 1, 76-93.

Goudie, A. J., Sumnall, H. R., Field, M., Clayton, H., & Cole, J. C. (2007), The effects of price and perceived quality on the behavioural economics of alcohol, amphetamine, cannabis, cocaine, and ecstasy purchases, Drug and Alcohol Dependence, **89**, 2-3, 107-115.

Grossman, M., Kaestner, R., & Markowitz, S. (2004), *An Investigation of the Effects of Alcohol Policies on Youth STDs, National Bureau of Economic Research*, Inc, NBER Working Papers: 10949.2004.

Gruenewald, P. J., Ponicki, W. R., Holder, H. D., & Romelsjo, A. (2006), Alcohol prices, beverage quality, and the demand for alcohol: quality substitutions and price elasticities, *Alcoholism: Clinical and Experimental Research*, **30**, 1, 96-105.

Heeb, J., Gmel, G., Zurbrugg, C., Kuo, M., & Rehm, J. (2003), Changes in alcohol consumption following a reduction in the price of spirits: a natural experiment in Switzerland, *Addiction*, **98**, 10, 1433-1446.

Hollingworth, W., Ebel, B. E., McCarty, C. A., Garrison, M. M., Christakis, D. A., & Rivara, F. P. (2006), Prevention of Deaths from Harmful Drinking in the United States: The Potential Effects of Tax Increases and Advertising Bans on Young Drinkers. , Journal of Studies on Alcohol, **67**, 2, 300-308.

Huang, C. D. (2003), *Econometric models of alcohol demand in the United Kingdom*, HM Customs and Excise, Government Economic Service Working Paper 140.

Keng, S.-H. & Huffman, W. (2007), Binge Drinking and Labor Market Success: A Longitudinal Study on Young People, *Journal of Population Economics*, **20**, 1, 35-54.

Kenkel, D.S. (1993) Drinking, driving and deterrence: The effectiveness and social costs of alternative policies. *Journal of Law and Economics* **36**(2):877–914.

Koski, A., Siren, R., Vuori, E., & Poikolainen, K. (2007), Alcohol tax cuts and increase in alcohol-positive sudden deaths--A time-series intervention analysis. , *Addiction*, **102**, 3, 362-368.

Kuo, M., Heeb, J., Gmel, G., & Rehm, J. (2003), Does price matter? The effect of decreased price on spirits consumption in Switzerland, *Alcoholism: Clinical and Experimental Research*, 27, 4, 720-725.

Lai, T., Habicht, J., Reinap, M., Chisholm, D., Baltussen, R., Lai, T., Habicht, J., Reinap, M., Chisholm, D., & Baltussen, R. (2007), Costs, health effects and cost-effectiveness of alcohol and tobacco control strategies in Estonia, *Health Policy*, **84**, 1, 75-88.

Laixuthai, A. & Chaloupka, F. (1993), Youth alcohol use and public policy, *Contemporary Policy Issues*, 11, 4, 70-81.

Mäkelä P, Bloomfield K, Gustafsson NK, Huhtanen P, Room R. (2008). Changes in volume of drinking after changes in alcohol taxes and travellers' allowances: results from a panel study *Addiction* **103** (2) , 181–191

Markowitz, S. & Grossman, M. (1998), Alcohol regulation and domestic violence towards children, *Contemporary Economic Policy*, **16**, 309-320.

Markowitz, S., Chatterji, P., & Kaestner, R. (2003), Estimating the Impact of Alcohol Policies on Youth Suicides*, Journal of Mental Health Policy and Economics*, **6**, 1, 37-46.

Markowitz, S. (2000), The price of alcohol, wife abuse, and husband abuse, *Southern Economic Journal*, **67**, 2, 279-303.

Markowitz, S. (2005), Alcohol, Drugs and Violent Crime, *International Review of Law and Economics,* **25**, 1, 20-44.

Markowitz, S. (2000), *An Economic Analysis of Alcohol, Drugs, and Violent Crime in the National Crime Victimization Survey*, National Bureau of Economic Research, Inc, NBER Working Papers: 7982.

Markowitz, S. (2000)*, Criminal Violence and Alcohol Beverage Control: Evidence from an International Study,* National Bureau of Economic Research, Inc, NBER Working Papers: 7481.2000.

Markowitz, S. (2000), The Effects of Beer Taxes on Physical Child Abuse, *Journal of Health Economics*, **19**, 2, 271-282.

Mast, B. D., Benson, B. L., & Rasmussen, D. W. 1999, Beer taxation and alcohol-related traffic fatalities, *Southern Economic Journal*, 66, 2, 214-249.

McCarthy, P. (2003), Effects of Alcohol and Highway Speed Policies on Motor Vehicle Crashes Involving Older Drivers, *Journal of Transportation and Statistics*, 6, 2-3, 51-65.

Mohler-Kuo, M., Rehm, J., Heeb, J. L., & Gmel, G. (2004), Decreased taxation, spirits consumption and alcohol-related problems in Switzerland, *Journal of Studies on Alcohol*; 65 (2) Mar 2004, 266-273.

Mullahy, J. & Sindelar, J. L. (1994), Do drinkers know when to say when? An empirical analysis of drunk driving, *Economic Inquiry*, **32**, 383-394.

Ohsfeldt, R. L. & Morrisey, M. A. 1997, Beer taxes, workers' compensation and industrial injury, *The Review of Economics and Statistics*, 79, 1, 155-160.

Parry, I. W. H. (2006), *Fiscal and Externality Rationales for Alcohol Taxes, Resources For the Future,* Discussion Papers.

Petry, N. M. (2001), A behavioral economic analysis of polydrug abuse in alcoholics: Asymmetrical substitution of alcohol and cocaine. , *Drug and Alcohol Dependence,***62**, 1, 31-39.

Ponicki, W. R., Gruenewald, P. J., & Lascala, E. A. (2007), Joint Impacts of Minimum Legal Drinking Age and Beer Taxes on US Youth Traffic Fatalities, 1975 to 2001, *Alcoholism: Clinical and Experimental Research*, **31**, 5, 804-813.

Rajaraman, I. (2007), Impact of Liquor Taxation on Consumption Patterns in India, *Journal of Policy Modeling,* **29**, 2, 195-207.

Ruhm, C. J. 1996, Alcohol policies and highway vehicle fatalities, *Journal of Health Economics*, **15**, 435-454.

Saffer, H. 2001, Substance abuse control and crime: Evidence from the National Survey of Drug Abuse, in *Economic Analysis of Substance Use and Abuse: The Experience of Developed Countries and Lessons for Developing Countries*, M. Grossman & C. R. Hsieh, eds., Edward Elgar, Cheltenham, 291-307.

Selvanathan, E. A. & Selvanathan, E. A. 2005, Empirical Regularities in Cross-Country Alcohol Consumption, *Economic Record*, **81**, 0, p. S128-S142.

Sen, B. 2003, Can Beer Taxes Affect Teen Pregnancy? Evidence Based on Teen Abortion Rates and Birth Rates, *Southern Economic Journal*, **70**, 2, 328-343.

Sen, B. 2006, The Relationship between Beer Taxes, Other Alcohol Policies, and Child Homicide Deaths, *B.E.Journals in Economic Analysis and Policy: Topics in Economic Analysis and Policy*, **6**, 1, 1-17.

Sivarajasingam, V., Matthews, K., & Shepherd, J. 2006, Price of beer and violence-related injury in England and Wales, *Injury-International Journal of the Care of the Injured*, **37**, 5, 388-394.

Sloan, F. A., Reilly, B. A., & Schenzler, C. (1994), Effects of prices, civil and criminal sanctions, and law enforcement on alcohol-related mortality, *Journal of Studies on Alcohol*, **55**, 454-465.

Stehr, M. (2007), The Effect of Sunday Sales Bans and Excise Taxes on Drinking and Cross-Border Shopping for Alcoholic Beverages, *National Tax Journal*, **60,** 1, 85-105.

Stout, E. M., Sloan, F. A., Liang, L., & Davies, H. H. (2000), Reducing harmful alcohol-related behaviors: Effective regulatory methods, *Journal of Studies on Alcohol*, **61**, 3, 402-412.

Sumnall, H. R., Tyler, E., Wagstaff, G. F., & Cole, J. C. (2004), A behavioural economic analysis of alcohol, amphetamine, cocaine and ecstasy purchases by polysubstance misusers. , *Drug and Alcohol Dependence*, **76**, 1, 93-99.

Trolldal, B. & Ponicki, W. (2005), Alcohol price elasticities in control and license states in the United States, 1982-99, *Addiction*, **100**, 8, 1158-1165.

Wagenaar, A. Salois, MJ, Komro, KA (2008). Effects of Beverage Alcohol Taxes and Prices on Consumption - A Systematic Review and Meta-analysis of 1003 Estimates from 112 Studies. *Presented at the 34th Annual Alcohol Epidemiology Symposium of the Kettil Bruun Society for Social and Epidemiological Research on Alcohol*, Victoria, British Columbia, June 2-6, 2008.

Wechsler, H., Kuo, M., Lee, H., & Dowdall, G. W. (2000), Environmental correlates of underage alcohol use and related problems of college students, *American Journal of Preventive Medicine*, **19**, 1, 24-29.

Young, D. J. & Bielinska-Kwapisz, A. (2006), Alcohol prices, consumption, and traffic fatalities, *Southern Economic Journal*, **72**, 3, 690-703.

Young, D. J. & Likens, T. W. (2000), Alcohol Regulation and Auto Fatalities, *International Review of Law and Economics*, **20**, 1, 107-126.

Zhang, J. F. & Casswell, S. (1999), The effects of real price and a change in the distribution system on alcohol consumption, *Drug and Alcohol Review*, **18**, 4, 371-378.

Table 2 Studies linking pricing to consumption

Authors Country	Study Design	Sample and Interventions	Methods	Consumption Outcomes	Limitations and Conclusions
Bradizza et al (2006) USA	Qualitative study using 10 focus groups	**Sample** 53 young adult men and women who regularly consume liquor (i.e. 40oz/week). Mean age 24 yrs.	**Outcome Measures** Attitudes to Malt liquor **Data analysis** Focus groups explored unique characteristics of malt liquor (low price, high alcohol content, large volume packaging) that enhance consumption patterns and increase risk for excessive alcohol use. Group transcripts analysed for recurring themes	Malt liquor was instrumental (quick intoxication) as well as practical (inexpensive) choice. Malt liquor viewed as beverage consumed by individuals who were struggling financially (economically disadvantages, students, minorities). Its cheap price made it possible to enjoy drinking alcohol without forgoing life essentials.	**Limitations** Limited sample size. **Reported conclusions (by authors).** Found consistency between quantitative and qualitative data.
Chaloupka & Wechsler (1996) USA	Model	**Study Setting** Students in 140 US colleges and universities **Sample at Baseline** Data from the 1993 Harvard College Alcohol Study n = 17,592 students	**Sampling Method** Self-administered questionnaires collecting sociodemographic information. **Outcome Measures** Effect of alcohol control policies on drinking **Data analysis** Probit method to establish relationships between beer price, alcohol availability, drunken driving and laws for youths and young adult	Beer is preferred beverage of choice among drinkers. Price of beer has a negative impact on drinking. The relationship is not significant for underage males but significant in underage and older females. Higher beer taxes could reduce binge drinking and underage drinking among college women e.g. There would be reduced drinking participation by 15% if tax	**Limitations** • Reliability of questionnaire of self-reported drinking is questionable. • Small effect of price on drinking among students may be caused by measurement error to the price variable i.e. inaccurate reflection of retail prices of alcoholic beverages for college student. • Detailed data on prices and sources for alcoholic beverages to students are unavailable. • Evidence for existence of causal relationship between campus environment and binge drinking is unavailable. **Reported conclusions (by authors).** • Increase in beer prices or raising excise taxes on

			drinking.	on alcohol in beer is equal to that on alcohol in distilled spirits in 1951. Furthermore, numbers of underage, 21 year olds and older college women engaging in binge drinking would be reduced by between 17 and 21%. Mixed effects of price, drink driving laws and alcohol availability has positive and significant effect on drinking and binge drinking. Positive relationship between alcohol availability and drinking and binge drinking.	beer would reduce both binge drinking and underage drinking among female college students. • However, a substantial tax increase would be required to achieve modest reductions in binge drinking by female students. • Strong restrictions on the availability of alcoholic beverages in college students are likely to lead to significant reductions in heavy drinking.
Chen et al (2006) USA	Focus Group, survey and quantitative methods	**Study Setting** Community college in central valley of California **Sample at Baseline** Focus Group: 29 18-25 year old students at community college who had consumed liquor in last 12 months Survey: 1226 students (87% response rate); 1056 usable responses	**Study Sample** Ethnically diverse college samples **Outcome Measures** Drinking motives (Cooper's drinking motives instrument) **Data analysis** Transcripts read and summarised.	**Focus Group:** First served at parties or encouraged by family or friends to drink. Influence of TV stars, rap stars and entertainers. **Survey:** Low cost positively associated with greater frequency and quantity of malt liquor use.	**Limitations** **External validity**: USA Student population **External validity:** malt liquor not beverage of choice in UK. **Reported conclusions (by authors).** Unique association between level of malt liquor use and low cost of malt liquor supports pricing concerns. Raising price and lowering alcohol content of malt liquor may help reduce consumption by young people.

Clements, Yang & Zheng (1997) Australia	Model	**Study Setting** Data from 7 countries Australia, Canada, Finland New Zealand, Norway, Sweden, UK (1955-1985)	**Outcome Measures** Estimation of conditional income elasticities **Data analysis** Application of additive utility (preference independence) to demand elasticities for alcoholic beverages.	Price elasticities are less than one in absolute value and spirits are most price elastic than wine and then beer. Beers, wines and spirits are preference-independent which means that the marginal utility of one beverage is unaffected by changes in the consumption of the other two.	**Limitations** None identified **Reported conclusions (by authors).** • Beer should be taxed at almost three times the rate for spirits, while wine tax should be approximately 50% higher than that for spirits. • Beer has the lowest income elasticity and the highest tax rate while spirits are the most income elastic and has the lowest tax rate.
Costanigro et al (2007) USA	Econometric study	**Study Setting** USA Wine Market **Study Sample** 13,157 observations from ten years (1991-2000) of tasting ratings in Wine Spectator magazine (California & Washington red wines)	**Outcome Measures** Tasting quality ratings **Data analysis** Computed eight different values for price and then established a "breaking point" to distinguish wine between price categories.	Consumers value wine attributes differently across wines depending on price range. Two market segments can be identified: consumption wines and collectible wines. Regional appellations have a positive effect on price only for inexpensive or mid-low price segment and are non-significant or negative for higher ones	**Limitations** Only examines red wines from two USA regions. Needs to validation against Europe, South African, South American and Australian markets and for other beverages. **Comments** Wine is identified as an "experience good" i.e. quality cannot be evaluated before consumption. **Reported conclusions (by authors).** • Wine shoppers make purchasing decisions with a price range in mind. Within price-range bottles are compared and a purchasing decision made. • For lower price wines this decision takes place at store whereas for higher priced wines decisions are informed by specialist magazines and reputation of wineries.
Gallet (2007) USA 3025	Meta-analysis	**Study Sample** 132 studies reporting alcohol price elasticities (1945-2003)	**Outcome Measures** Price elasticities **Data analysis** Number of observations and median elasticity	Number of observations (median price elasticity) Beer 325 (-0.36) Wine 300 (-0.700) Spirits 294 (-0.679) Alcohol 263 (-0.497) Adult 22 (-0.556) Young Adult 13 (-0.386)	**Limitations** • Differences in specification of alcohol demand across literatures with median elasticities being larger for more recent methods. **Reported conclusions (by authors).** • Wine and spirits most responsive to price and income. • Unusual finding suggesting younger individuals are

				Teen 1 (1.167)	less responsive to price than older individuals – may be due to differences in consumption bundles across age groups. • Wine has largest income elasticity, followed by spirits then beer. • Given differences in price elasticity across beverages and consumer age groups optimal tax will account for such differences. Optimal tax will account for interdependencies in demand across beverages. • As teens are least responsive to price, reduction of teen alcohol consumption should examine alternatives to taxation e.g. education campaigns.
Heeb et al (2003) Switzerland	Longitudinal population survey	**Study Setting** Reduction in price of spirits in July 1999. **Sample at Baseline** Probabilistic telephone sample of 1347 individuals with at least monthly consumption in previous 6 months. Response rate at baseline was 74.8%	**Study Sample** Follow up 3 months after price change. Attrition rate from baseline to follow up was 20.2%. **Outcome Measures** Alcohol consumption assessed by beverage-specific graduated frequency measure. High volume drinking was defined as 40+ g/day for men and 20+ g/day for women. Binge drinking was defined as 6+ drinks on an occasion for men and 4+ drinks for women **Data analysis** Used combinations of drinking categories at baseline and follow-up to account for changes due to regression to the mean.	Spirits consumption increased significantly (by 28.6%) in total sample and specifically in young males and in individuals who were low volume drinkers at baseline. Consumption of alcohol overall, or of wine and beer, did not change significantly. No indication of effects of substitution.	**Limitations** • Longitudinal data may confound intervention effect with regression to the mean. Partly controlled in this study by distinguishing stable drinkers from reducers and increasers. • Study excluded abstinent responders and very light drinkers • Impulsive consumption associated with presumed bargain opportunities may be responsible for early increase. **Comments** Findings criticised by Bergler (2003). Industry expert for Groupement Suisse des Spiritueux de Marque. **Reported conclusions (by authors).** Spirits consumption showed price-responsiveness in early post-intervention period. Increase in spirits consumption took place at time of generally declining consumption of alcohol. In contrast to most studies price reduction, increased availability.
Huang (2003) UK	Econometric modelling	**Study Setting** HM Customs and Excise (HMCE) (1970-2002)	**Outcome Measures** Estimation of the alcohol demand models **Data analysis**	Estimated elasticities with respect to prices: On-trade Beer = -0.48 Off-trade Beer = -1.03 Spirits = -1.31	**Limitations** • Not all econometric test statistics are conclusive. Therefore further refinements are required. • Not all parameters have been accurately measured by estimation method especially terms for cross-

			A co-integration modelling approach. 4 sets of empirical demand models built for on-trade beer, off-trade beer, spirits, and wine excluding coolers. Model follows a single-equation approach based on the standard consumer demand theory.	Wine = -0.75 Estimated elasticities with respect to income: On-trade Beer = -0.18 Off-trade Beer = 0.55 Spirits = 0.69 Wine = 1.51	price elasticity. **Reported conclusions (by authors).** Plausible own-price and cross-price elasticities have been estimated for the UK up to the year 2002. As income goes up, people buy more off-trade beer, spirits and wine, but not on-trade beer – the authors suggest that on-trade beer may be considered an inferior good.
Keng & Huffman (2007) USA **Binge drinkers**	Econometric modelling	**Study Setting** National Longitudinal Survey of Youth (1979-1994) **Sample at Baseline** American adults, blacks, Hispanics and economically disadvantaged youth **Study Sample** 12,686 young men and women (14-21 yrs) Data for the price and alcohol: *Cost of Living Index (1978-1995)*	**Outcome Measures** To investigate effect of Increasing alcohol prices on probability of individuals engaging in heavy binge drinking **Data analysis** Two fitted econometric models presented Long-run and short-run elasticities of binge drinking	Binge drinking is price responsive to the price of alcohol: 1% increase in local alcohol price decreases the probability of an individuals engaging in heavy binge drinking by 2.36 and 1.29% in long run and short run, respectively. Binge drinking by young people is highly responsive to state taxes on alcohol. Increase in local alcohol price decreases occasions of binge drinking, and thus the individual is less likely to become a binge drinker. 1% increase in alcohol price has short-run effect on raising annual earnings by 0.21% and a long-run impact of 0.45%.	**Limitations** • Empirical results support rational addiction model that individuals drinking behaviour is rational and that binge drinking, health status and earnings are jointly determined. • Data used are limited to individuals younger than 40. Therefore negative effect of binge drinking on health and earnings may be even greater for older individuals. **Reported conclusions (by authors).** • Individual's demand for binge drinking can be reduced significantly by increase in alcohol price. • As NLSY79 cohort becomes older, there will be more research into effects of binge drinking and other decisions e.g. health investment and earnings
Kuo (2003) Switzerland	Longitudinal study	**Study Setting** Tax reform led to 30-50% decrease in price for foreign spirits. **Sample at Baseline** 4007 residents aged 15 years or older participated in baseline survey 3 months before tax reform.	**Study Sample** 73% participated in follow up survey 28 months after reform. **Outcome Measures** Alcohol consumption; drinking habits, problem drinking and purchase of spirits. **Data analysis** Increase in spirits consumption persisted even after adjustment for significant	Consumption of spirits increased after price of spirits decreased. Increase in spirits consumption consistent across subgroups, except group aged 60 or older. Younger people are more affected by price than older persons.	**Limitations** • Used self-report • Longitudinal study subject to attrition **Reported conclusions (by authors).** Younger people are more affected by price than older persons. Price should be considered an effective policy to reduce alcohol misuse and alcohol-related problems, especially among the younger population.

			correlates of spirit consumption. Apart from age there was no evidence that increase in spirits consumption differed between subgroups by sex, region, working status, education, drinking frequency, or average number of drinks.		
Laixuthai & Chaloupka (1993) USA **Binge drinkers**	Time series analysis	**Study Setting** Surveys 1982 and 1989. **Sample at Baseline** 1982 n = 13,240 1989 n = 12,880.	**Outcome Measures** Effects of minimum legal drinking ages and beer excise taxes on youth and heavy drinking in 1982 and 1989. **Data analysis** Probit estimates of alcohol consumption frequency.	Increasing taxation on alcohol to keep pace with inflation would lead to a 19% reduction in heavy drinking by youths and 6% reduction in high-risk drinking. 1982 and 1989: Beer tax coefficient is negative and significant. Beer tax increase can reduce frequency of youth drinking and reduce probability of heavy drinking. Tax elasticities of youth drinking in past month -0.97, -0.50, -0.01 and +0.73 for frequent drinkers, fairly frequent drinkers, infrequent drinker, and abstainers, respectively. Comparable elasticities for drinking in past year were -0.72, -0.20, +0.28 and +0.8, respectively.	**Limitations** Elasticities for abstainers appear methodologically doubtful. **Comments** Classified frequency (past year, past month); frequent drinkers; fairly frequent drinkers; infrequent drinkers; abstainers. Examined binge drinking. **Reported conclusions (by authors).** Increasing alcoholic beverage prices and/or increasing MLDA reduce youth's frequency of alcohol consumption and their heavy drinking.
Mohler-Kuo et al (2003) Switzerland	Longitudinal study	**Study Setting** Following 1999 tax reforms foreign spirit prices markedly reduced and spirits consumption increased significantly. **Sample at Baseline** Randomly selected sample of 4,007 residents 15 yrs or older. Baseline survey conducted 3 months before tax reform	**Study Sample** 73% of sample participated in follow up survey. Follow up conducted 28 months after tax reform. **Outcome Measures** Alcohol measured on basis of graduated frequency and alcohol related problems measured by items from Alcohol Use Disorder Identification Test (AUDIT) **Data analysis** Multiple regression models showed that spirits, beer and wine consumption, gender Age*spirits consumption	68% of increase in alcohol related problems was linked to increased consumption of spirits. Alcohol related problems increased significantly at follow up. Significance disappeared after controlling for spirit consumption. Alcohol related problems increased more among younger age groups.	**Limitations** • Study used self-report • Longitudinal study subject to attrition **Comments** Represents rare natural experiment exploring effects of taxation changes and increased foreign competition. **Reported conclusions (by authors).** Alcohol-related problems increased at follow-up, particularly among younger age groups who consumed more spirits. Prevention programs on alcohol-related problems should target young people.

			interaction, region smoking status, heavy drinking frequency and average number of drinks were significant correlates of alcohol-related problems.		
Selvanathan & Selvanathan (2005) Australia	Correlation study	**Study Setting** Analyses demand for beer, wine and spirits in 10 countries including UK. **Study Sample** Australia, Canada, Finland, France, Japan, New Zealand, Norway, Sweden, UK and USA.	**Outcome Measures** Cross-country elasticities	• in nine out of the 10 countries, beer is considered a necessity, • in half the countries wine is necessity • in all the countries spirits are luxury; • in all the countries, the demand for beer, wine and spirits are price inelastic.	**Limitations** None identified **Reported conclusions (by authors).** Found several empirical regularities at cross-country level. This includes: (i) the demand theory hypotheses, homogeneity and symmetry are generally acceptable; (ii) the additive utility hypothesis is also acceptable even for such narrowly defined commodities
Wagenaar et al 2008 International **Harmful drinkers**	Meta-analysis	**Study Sample** 112 studies of alcohol tax or price effects found, containing1003 estimates of the tax/price→consumption relationship.	**Outcome Measures** Relationships between measures of beverage alcohol tax or price levels and alcohol sales or self-reported drinking. **Data analysis** Using reported estimates, standard errors, t-ratios, sample sizes and other statistics, calculated partial correlation for relationship between alcohol price or tax and sales or drinking measures for each major model or subgroup reported within each study. Random-effects models used to combine studies for inverse variance weighted overall estimates of magnitude and significance of relationship between alcohol tax/price and drinking.	• Simple means of reported elasticities are -0.46 for beer, -0.69 for wine, -0.80 for spirits. • Meta-analytic results document highly significant relationships ($p<.001$) between alcohol tax or price measures and indices of sales or consumption of alcohol (aggregate-level $r = -0.17$ for beer, -0.30 for wine, -0.29 for spirits, and -0.44 for total alcohol). • Price/tax also significantly affects heavy drinking ($p<.01$), but the magnitude of effect is smaller than effects on overall drinking.	**Limitations** • Analyses exclusively based on reports published in English. Exclusion of non-English studies could lend to inflated meta-estimates of effect. • Possible that substantial number of studies with nonsignificant effects remain unpublished. Excluding these may introduce upward bias into obtained effect estimates. • Did not exclude available unpublished studies, but did not implement extensive searching for difficult-to-find unpublished studies. Results may be subject to publication bias. **Comments** Studies included analyses of alternative outcome measures, varying subgroups of the population, several statistical models, and use different units of analysis. Multiple estimates were coded from each study, along with numerous study characteristics. **Reported conclusions (by authors).** • Large literature establishes beyond doubt that beverage alcohol prices and taxes are inversely related

					to drinking. • Effects are large compared to other prevention policies and programs. Public policies that raise prices of alcohol are an effective means to reduce drinking and thus the societal burden of alcohol-related deaths, injuries, and damage.
Wechsler, H et al. (2000) USA Price, consumption and harm	Harvard School of Health College Alcohol Study (CAS) Survey	**Study Setting** 116 schools located in 39 states, a cross-section of American higher education in 1997 **Sample at Baseline** Students <21 years (n=7061): 37% male 21-23 years (n=4989): 43% male **Study Sample** 116 4-year colleges and Universities	**Outcome Measures** Compared drinking behaviour between underage and of-age students. **Data analysis** Multiple logistic regression models to measure association between UA binge drinking and correlates such as access to alcohol and price.	54% of UA students could easily obtain alcohol. 80% of UA students obtained alcohol from of-age students UA students were more likely than of-age students to get free drinks (25% vs 5%) and to pay a set price ($1) for unlimited drinks (32.1% vs 11.3 %). Of-age students were more likely to pay $1 to $3 per drink (63% vs 34%) and >$3 (21% vs 8%) per drink than UA students. Students paying less per drink or who received drinks for a set price were more likely to binge. Students who drank beer, liquor or no preferred type more likely to binge than those who drank wine. UA students who drank alcohol in past year significantly more likely to experience 8 or 12 specified alcohol related problems than did of-age students. Also more likely to experience >5 alcohol-related problems. Males more likely to binge drink than females (50% vs 41%)	**Limitations** • Questionnaire response rate of students at 116 colleges was 60% • Beer was preferred drink possibly because it was purchased in large volumes in first instance. • Questions ability UA and off-age students to recall and report alcohol-related problems in past year. • CAS is subject to limitation of self-report surveys. • Bias introduced through non-response. • In multiple logistic regression models, response rate not associated with either binge drinking or other covariates. **Reported conclusions (by authors).** • Beer was students' preferred drink possibly because of sale of beer in large volumes. • Little is known about ability of students to obtain alcohol at reduced prices, more studies required. • Better controls required to lower levels of binge drinking, health-related and behavioural problems of underage students e.g. price, access, frequency, MLDA and off-campus parties.

Zhang and Casswell, (1999) New Zealand	Time series analysis	**Study Setting** New Zealand 1984–1996	**Outcome Measures** Volume of beer and wine consumption	▪ If real price of beer increased 10%, volume of beer consumption per capita in New Zealand immediately decreased by estimated 10.2%. ▪ If real price of wine decreased 10%, volume of wine consumption per capita in New Zealand immediately increased by estimated 7.1%.	**Limitations** None identified **Comments** ▪ Further influence on alcohol consumption was introduction of wine into grocery stores, which led to a sudden permanent increase in wine consumption 3 months after legislation came into force. ▪ Beer and spirits not introduced into supermarkets at this time and while there was no effect on beer consumption there was a significant decrease in spirits consumption.

Table 3 Studies linking taxation and consumption

Authors Country	Study Design	Sample and Interventions	Methods	Consumption outcomes	Limitations and Conclusions
Duarte (2004) Spain	Spanish Surveys on Drug Use in the school population 1994,1996 and 1998	**Study Setting** Information collected in different public and private centres of secondary education and vocational training. Random selection procedure used to determine where adolescents were interviewed. **Study Sample** Adolescents aged between 14 and 18 years	**Outcome Measures** Whether or not adolescent has abused alcohol during last 30 days. To consider socioeconomic factors to explain why Spanish adolescents abuse alcohol such as smoking, jobs, tobacco consumption etc. **Data analysis** Probit for the five representative Spanish regions.	The probability of alcohol abuse is higher among male adolescents than among their female counterparts. Informative campaigns must be accompanied by effective policy measures capable of influencing the habits of The effect of income on the probability of abuse: income elasticity is positive and <1. Adolescent males show higher income elasticities than their female counterparts in Andalucia, Valencia, Galicia. Probability of abuse increases with age in a majority of sample regions. Permissive family environment with respect to tobacco use and especially the adolescent's own smoking habit tends to increase the probability of alcohol abuse by the adolescent.	**Limitations** None identified **Comments** • Primarily focused on consumption and factors that influence alcohol abuse in under 16's. • Does not look at relationship between price/tax and consumption/harm. **Reported conclusions (by authors).** • Male adults abuse alcohol with a higher probability than their female counterparts. • Youngest age group, under 16's are most appropriate target for policy-makers with preventive measures. • Income is a significant and positive determinant of abuse. • Education failure is another determinant of abuse. • Alcohol abuse is accompanied by tobacco consumption. • Habitual reading reduces the probability of alcohol abuse. • More information tends to reduce the probability of abuse. • For informative campaigns to be effective, should use language that adolescents can identify with
Freeman (2000) USA	Panel estimation	**Study Setting** Alcohol consumption for 50 states and the District of Columbia (1961-1995)	**Outcome Measures** To produce MG, PMG and DFE estimators for the demand of beer **Empirical Data analysis** Three techniques of estimating panels of alcohol demand: DFE, PMG and MG.	MG estimates: Seventeen states had negative income elasticities and 21 states had positive tax elasticities. Long-run income elasticity from -3.65 to +4.78 Tax elasticity from -1.84 to +1.62 PMG estimates: Long-run income elasticity from +0.76 to +0.79 Tax elasticity from -0.06 to -0.07 DFE estimates: Long-run income elasticity from +0.293 to +0.382 Tax elasticity is -0.10 Past increases in excise taxes on beer have had only	**Limitations** • Three models produced different estimates of long-run elasticities. • Actual beer prices were not available for individual states over the time period covered in the present analysis. So beer taxes are used as a proxy for beer prices. • Historically tax levels have not been sufficiently high to affect levels of beer consumption. • Must be careful in extrapolating tax increase results, there are likely to be non-linearities in tax elasticities because of the significance of the alcohol tax threshold to the

				modest effects on beer consumption, with short-run elasticities around 0.01 and long-run elasticities around -0.10 (less than previous studies).	consumer, and the level of taxation that may lead to the end of drinking. **Reported conclusions (by authors).** • Tax increases results in immediate reductions in beer consumption which also leads to long-term reductions through the habit formation characteristic of alcohol consumption. • Tax levels in the past have not be sufficiently high to affect levels of beer consumption. • Results affirm view that increases in beer excise taxes would be effective measure for raising revenue and for offsetting external costs on alcohol abuse.
Gius (2002) USA	Model	**Study Setting** Data from National Longitudinal Survey of Youth – Geocode (NLSY) since 1979 and state-level alcoholic beverage tax rates. **Sample at Baseline** n = 12,686 **Study Sample** Men and women between ages 14-22. 893 observations and drinker-only sample n = 595 observations	**Outcome Measures** Effect of taxes on alcohol demand **Data analysis** Binomial probit regression analysis	Alcoholic beverage taxes have no effect on alcohol consumption. Taxes have no effect on the number of drinks consumed or on binge drinking (6 or more drinks on one occasion). Elimination of aggregate variables shows that tax does affect alcohol consumption. Distilled spirit and wine taxes have positive effects on alcohol consumption whereas beer has negative effects on consumption.	**Limitations** • Not all states in USA were examined **Reported conclusions (by authors).** • Alcoholic beverage taxes in 1994 had no effect on alcoholic beverage consumption in adults aged 29-33 years. Results contradict prior studies. • A revised regression that eliminates aggregate variables found that tax may have a statistically-significant effect on alcohol consumption.

Makela et al (2008)	General population random samples surveyed before and after taxation changes, using northern Sweden as a control site.	**Study Setting** Denmark, Finland, southern Sweden and northern Sweden **Study Sample** Respondents aged 16–69 years.	**Outcome Measures** Volume of drinking is main measure reported. **Data analysis** Changes are examined by gender, age, income and year 2003 consumption level.	Consumption decreased or remained same among women and men in all three study sites. Relative changes were similar across subgroups of age, gender and income in all countries. In absolute terms, there was consistent differential change by age in Denmark, Finland and Southern Sweden, with higher level of young and lower level of old converging. Women's and men's consumption converged in Finland and southern Sweden. Changes did not differ systematically by income. Changes were not larger among heavier drinkers.	• Studies short-term changes in alcohol consumption by subgroups of the population in Denmark, Finland and southern Sweden following large-scale decreases in alcohol taxation in Denmark and Finland and large increases in travellers' allowances in Finland and Sweden. **Reported conclusions (by authors)** • Results did not confirm expectations: an increase in consumption larger than that in control site could not be shown in any of countries or subgroups of population. • Any effect – as shown in aggregate data in Finland – seems to have been stronger among the old than young and, in Finland and southern Sweden, among women rather than men • The lack of significant changes in reported consumption in these surveys (despite substantial changes in price) is unexpected, and not in accordance with expectations from economic literature. • Findings pose substantial puzzles for further research.
Rajaraman, (2007) India	Econometric modelling	**Study Setting** Survey on distribution of sample households by liquor intensity classification in India. **Study Sample** 1194 households from 116 villages	**Outcome Measures** Data on liquor consumption. **Data analysis** Logit Model	402 households reported liquor consumption. 230 report daily consumption. There was access to a liquor vend within the village for 84% households. Ease of access has statistically significant impact on probability of household consuming liquor and probability of a household having at least one daily drinker.	**Limitations** • Does not address the prohibition issue and does not estimate elasticities of any kind. • No quantitative data collected on expenditure on liquor. • Does not estimate impact of drinking on nutritional status of children. • No price variable modelling. **Reported conclusions (by authors).** • Recommendation in line with the developed world towards price-based rather than physical controls on alcohol abuse. • Rise in retail price of alcohol will have adverse effects for households with price-inelastic consumption. • There is a high probability of daily drinking among underprivileged households which implies intergenerational perpetuation of their lower education and economic status.

Stehr, (2007) USA	Econometric modelling	**Study Setting** Data on unemployment rates, per-capita income, fraction black, Hispanic, Asian, Native American are from the Bureau of Labor Statistics. Price data for beer and spirits taken from the 1990-2004 third quarter editions of the ACCRA. Data on sales of beer and spirits from DISCUS. Data on Sunday sales laws from beer drawn from Alcohol policy Information System.	**Outcome Measures** To estimate effects of repeal of Sunday sales bans on sales of beer and spirits. To estimate effect of these repeals along with interstate price variation on degree of state border crossing to purchase beer and spirits	In both beer and spirits regression, beverage state tax is negative and significant indicating higher taxes are associated with significantly lower sales. Average sales per-capita increase sales of beer or spirits increase by 4.1% to 5.3% following the repeal of the Sunday sales ban. The beer tax act by reducing consumption of beer rather than by displacing sales across state borders. Price elasticity of demand for spirits is -2.44, higher than most other recent estimates. Price elasticity of beer is 1.02.	**Limitations** None identified **Reported conclusions (by authors).** • Higher taxes on beer and spirits reduce drinking. • Consumers do cross-borders in response to increases in the state excise tax on spirits. • Change in state sales of spirits overstates the effect if tax or price policies on drinking partly because of sales across state borders. • Increasing taxes on spirits are more effective in reducing drinking if they are coordinated across states. • There is no apparent economic rational for banning the sale of alcohol on Sunday.

Table 4 Studies linking taxation and harm

Authors Country	Study Design	Sample and Interventions	Methods	Harm Outcomes	Limitations and Conclusions
Chaloupka, Saffer & Grossman (1993) USA	Time-series analysis	**Study Setting** Motor vehicle fatality rates from the National Highway Traffic Safety Administrations (NHTSA) Data from 48 states for the period 1982-1988.	**Outcome Measures** Effect of alcohol control policies on drinking and driving **Data analysis** Model of the effect of penalties for drunk driving	Beer tax coefficients are negative and significant. Beer taxes have a negative effect on drunk driving and that effect is larger for young drivers than for older drivers. Three alternative increases in the beer tax are simulated: 1) Beer tax in 1951 An increase 16 cents to 71.6 cents per six-pack (447% beer tax increase in 1988) would reduce total fatalities by 5,174 or 11.5% of all fatalities. For the 18-20 year olds, fatalities would be reduced by 1,660 or about 32%. 2) Tax of beer = tax on distilled spirits An increase to 78.4 cents (490% increase in the federal beer tax in 1988), would reduce total fatalities per year by 5,771 or approximately 12.8% of all fatalities. For the 18-20 year olds, 1,822 fatalities would be prevented or 35.2% of all fatalities in this group. 3) Doubling of tax to 32% in 1990 Reduced fatalities per year by 1,744 or ~3.9% of all fatalities. Reduced fatalities in the 18-20 year old group by 611 or about 11.8% of all fatalities. Beer tax elasticity for total fatalities is -0.21 (18-20 year olds) and -0.07 for all ages.	**Limitations** • Multiple laws lead to collinearity in the data set which could be reduced by limiting the number of variables. However this could result in omitted variable bias. **Reported conclusions (by authors).** • Beer tax and the one-year administrative licence action are the most-effective policies. • Higher alcohol prices reduce traffic accident fatalities. • Several drunk-driving laws especially laws associated with severe sanctions can be effective deterrents to drink-driving. Beer taxes had a negative effect on drunk driving with greater effect found for young, rather than old, drivers.
Chesson et al (2000)	Econometric study with regression	**Study Setting** 50 states and District of	**Study Sample** 15 year period (1981-1995)	Higher alcohol rates associated with lower STD rates, both for men and women.	**Limitations:** None identified

USA	analysis	Columbia (DoC) for beer tax; 32 states (plus DoC) without monopolies for liquor tax	**Outcome Measures** Gonorrhea and syphilis rates per 100,000 population **Data analysis** Reduced-form regressions of STD rates on state alcohol taxes (with controls for state and year)	A $1 increase in the per-gallon liquor tax reduces gonorrhea rates by 2.1 percent A beer tax increase of $.20 per six-pack reduces gonorrhea rates by 8.9 percent, with similar though more pronounced effects on syphilis rates.	**Reported conclusions (by authors).** Presents evidence that sexually transmitted disease (STD) rates are responsive to increases in alcohol taxes and in the drinking age. The presumed relationship is that a more restrictive alcohol policy reduces alcohol consumption, which in turn decreases risky sexual activity. Quasi-experimental analysis of alcohol policy changes supports these findings and offers evidence that increases in the drinking age reduce STD rates among youth. The estimated external cost of alcohol-attributable STDs exceeds $556 million annually (2000 figures) which should be considered in determining optimal alcohol policy.
Chisholm et al (2004) International	Population model	**Study Setting** 12 epidemiological WHO subregions	**Outcome Measures** Costs in international dollars ($) Intervention effects in Disability-adjusted life years. **Data analysis** Average and incremental cost-effectiveness ratios (CERs computed)	In populations with high prevalence of heavy drinkers (more than 5%) [e.g. Europe and North America] most effective and cost-effective intervention was taxation (500 DALYs averted per million). In populations with lower prevalence of heavy drinking taxation less effective than brief physician advice, roadside breath testing and advertising bans.	**Reported conclusions (by authors).** Most efficient intervention response depends on prevalence of heavy alcohol use (related to overall per capita consumption). Population-based measures such as taxation most effective in populations with high or moderate levels of heavy drinking. More targeted interventions are indicated in populations with lower rates of hazardous alcohol use.
Cook et al (2005) USA	Simulation model	**Study Setting** United States population aged 35-69 **Study Sample** Representative sample of 43,093 non-institutionalised Americans aged 18 and over. (2001-2002)	**Outcome Measures** All-cause mortality **Data analysis** Explores three assumptions: decrease of 1% in alcohol consumption within population; impacts at intensive and extensive margins; and effect entirely at extensive margin.	Numbers are small to point of triviality when compared with 700,000 deaths in this age group per year (fewer than 200 lives are at stake).	**Limitations:** First two models show increase in relative risk but third shows a decrease. **Reported conclusions (by authors).** A permanent reduction of 1% in alcohol consumption would have little net effect on mortality in middle age. Since there is no health benefit of drinking for younger people they conclude there is a strong case for increased alcohol taxation.

Dave & Kaestner (2002) USA	Survey	**Study Sample** Current Population Survey 1979-2004	**Outcome Measures** Employment, weekly work hours and wages **Data analysis** Empirical models based on human capital model of wages and static labour supply model Examines two different age groups 25-34 and 35-54 yrs.	Alcohol tax has negative or zero effect on employment of adult males. However liquor taxes are negatively correlated to employment. All estimates for adult females are negative and many are statistically significant.	**Limitations** Finding is inconsistent with previous studies Omits young and old limiting analysis to 24-54 years Large standard errors not due to small sample sizes but indeterminacy of relationship between alcohol taxes and employment. **Reported conclusions (by authors).** Alcohol use does not adversely affect labour market outcomes
Dee (1999) USA	Model	**Study Setting** 1977-1992 Monitoring the Future Surveys.	**Data analysis** Model based on panel of state-level data.	Tax responsiveness of teen alcohol use is relatively small and statistically insignificant. Reduced form estimations that model teen traffic fatalities as a function of state policies.	**Reported conclusions (by authors).** • Teen drinking is highly tax-elastic. • Beer tax has a small and statistically insignificant impact on teen drinking.
Grossman (2004) USA	Multivariate regression models	**Study Setting** Data from state health departments National Electronic Telecommunications Systems for Surveillance (NETSS) 1981-2001 **Sample at Baseline** Sample n = 950 for gonorrhoea and n = 1854 for AIDS.	**Study Sample** Teens aged 15-19 Young adults aged 20-24. **Outcome Measures** Impact of alcohol prices n gonorrhea and AIDS rates for teenagers and young adults.	10% increase in average state excise tax on beer will reduce gonorrhea rate by 4.7%for males aged 15-19 and by 4.1% for males ages 20-24. AIDS rates for males ages 20-29 and 30-34. For younger males, the short-run elasticity is -0.20 and the long run elasticity is about -0.24. Results for female AIDS rates are similar to those for males in that the tax coefficients are negative and statistically significant in the OLS models.	**Limitations** • Underreporting of diseases presents problem for multivariate estimation. • AIDS rates may be reduced with higher beer taxes, although this result is not robust to models which include lagged AIDS rate. • Problems with matching the alcohol control variables to the transmission date of HIV. • Research does not prove much policy guidance on how to reduce gonorrhea rates for females – a direction for future research. • 1999 zero tolerance laws are no longer a viable policy tool to reduce teenage male gonorrhea rates. • While state dummies help capture time-invariant state-level factors which may be correlated with alcohol policies and STDs, time-variant factors may still remain in the error term and have the potential to bias results – it is difficult to predict the direction of any such bias. • Nature of causal relationship between risky sexual behaviours

					and alcohol consumption is still in question. **Reported conclusions (by authors).** • Higher beer taxes and the presence of zero tolerance laws are associated with reductions in male gonorrhea rates, although other alcohol policies such as BAC laws and dry counties appear to have no effects.
Koski et al (2007) Finland	Time-series quasi-experimental approach to three alcohol policies	**Study Setting** Removal of traveller's allowance quotas on EU imports; lowering of excise duties; Estonia (neighbour) joining EU. 1990-2004. **Study Sample** Weekly series of 33,782 alcohol-positive cases (at least 0.20 mg/g alcohol in blood) and control series of 37,617 alcohol-negative cases.	**Outcome Measures** Alcohol-positive sudden deaths **Data analysis** In models applied to control series of alcohol-negative deaths, no impact coefficients were statistically significant.	Liberation of traveller's allowances had no impact on alcohol-positive sudden deaths. Impact of alcohol tax cuts (March 2004) was significant, resulting in an estimated eight additional alcohol-positive deaths per week (17% increase compared with weekly average of 2003). Impact of Estonia joining EU was not statistically significant.	**Limitations** • Effect of other factors partly controlled by having comparison group. **Reported conclusions (by authors).** Alcohol tax cuts associated with increase in number of sudden deaths involving alcohol. This parallels reported increases in alcohol consumption and alcohol-related causes of death in 2004 in Finland.
Lai et al (2007) Estonia	Cost effectiveness model	**Study Setting** Estonia **Sample at baseline** Major postal general population health survey; mortality registry data;	**Outcome Measures** Costs in Estonian Kroon for 2000 Effects in Disability Adjusted Life Years averted **Data analysis** Uses standard WHO-CHOICE methodology	Increased excise taxes are most cost-effective intervention to reduce hazardous alcohol consumption 759 EEK (£49) per DALY averted. Tax increases of 25% or 50% would cost the same to implement but the former would result in 2727 DALYs averted per year whereas the latter would result in 3096 DALYS. Compared to WHO-CHOICE regional estimates,	**Limitations** All interventions evaluated against a "do nothing" scenario. **Comments** Implementation time span is 10 years but follow up modelled over 100 years. **Reported conclusions (by authors).** First priority is increased taxation, followed by advertising bans and other interventions.

		morbidity rates based on literature review; patient related costs from health insurance database		interventions were less costly and thereby more cost-effective in Estonia.	Differences between WHO-CHOICE regional cost-effectiveness estimates and contextualised results underline importance of country level analysis.
Markowitz & Grossman (1998) USA	Regression analysis	**Study Setting** Violence in the home. Data from 1976 Physical Violence in American Families survey. **Study Sample** 2,143 married/ cohabiting individuals and 1,147 children ages 3-17.	**Outcome Measures** Measure of domestic violence using the Conflict Tactic Scale (CTS). **Data analysis** Two probit models to estimate the relationship between alcohol consumption and domestic violence.	There is a negative and statistically significant coefficient of the excise tax on beer. As the state excise tax on beer increases, the probability of the overall violence towards children decreases. Tax elasticity is -0.12. Severe violent behaviour: There is a negative and significant effect of tax on beer. Tax elasticities for severe violence is -0.23 and for overall violence -0.12. A decrease in the number of outlets will decrease the probability of severe violence. The marginal effect of the number of outlets is 0.04. A 1% tax increase in beer will decrease the acts of violence by 0.10% The average elasticity is -0.093.	**Limitations** • Responses that were meant as punishment or as violence were indistinguishable. • The survey depends on the reliability of the respondents' answers to occasions of violence. • Omitted variable bias is a serious problem. Including all control variables leads to multicollinearity. **Reported conclusions (by authors).** - Violence aimed at children can be reduced by increasing the tax on beer. A 10% increase in tax would reduce the probability of severe and overall violence by 2.3% and 1.2%, respectively. - Laws that make obtaining beer more difficult may be effective in reducing violence such as decreasing number of licensed outlets. - Laws restricting advertising of beer ineffective in reducing violence.
Markowitz & Grossman (2000) USA	Cross-sectional analysis	**Study Setting** National Family Violence Survey (NFVS) 1976 and 1985 Conflict Tactic Scale (CTS) was used to measure domestic violence in NFVS surveys. **Sample at Baseline** 2675 parents who have children of ages 0-17.	**Outcome Measures** To find link between price increases and the impact on violence by males compared to females. **Data analysis** Probit estimates of two models of violence. First model show state excise tax on beer supplemented by second model with price, advertising and availability measures.	Female (1976) – Beer tax in both models are negative. A 1% increase will decrease probability of violence by 0.33%. An increase in the number of outlets to sell liquor will increase the probability of violence towards children. Prohibition of off-sale beer and drug prices, three of the four advertising restrictions could not explain variations in violence. Female (1985) – Average elasticity of -0.13. Violence by women is sensitive to the price of cocaine. Restrictions in availability and advertising measures have no impact on severe violence Male (1976) – Beer tax is negative and significant. The addition of other control variables greatly reduces the effect. Male (1985) – Beer tax is positive and significant. No	**Limitations** • A limitation of fixed-effects model is that the sample size is small. **Reported conclusions (by authors).** • An increase in beer tax may decrease the incidence of violence committed by females but not by males.

				evidence exists with other regulatory variables (drug prices, availability measures, or advertising is statistically significant in reducing probability of violence.	
Markowitz (2000) USA	Longitudinal Study	**Study Setting** Data from National Crime Victimization Surveys (1992, 1993 and 1994) **Sample at Baseline** n = 364,266	**Study Sample** Survey: 33% assaults 46% rapes 25% robberies **Outcome Measures** To estimate the probability of being a victim of violent crime. **Data analysis** Linear probability model (LPM) and fixed effects models.	Assault: Higher taxes lead to a lower incidence of assault, but not rape or robbery. Also lowers probability of alcohol or drug involved in assault. Rape: Drugs and alcohol have no effect on the probability of rape. More alcohol selling outlets will increase the probability of rapes. Results indicate that higher alcohol availability leads to more rapes. A 1% increase in the number of outlets will result in a 1.75% increased probability of rape. Robbery: Increasing tax has no effect on probability of being a victim of robbery. Higher prices of marijuana and cocaine decrease probability of robbery victimization. Higher alcohol selling outlets also have no effect on robberies. Drug- or alcohol-involved assault: Higher taxes will lead to a lower probability of assault with tax elasticity of LPM models at -0.06 and -0.76. Drug- or alcohol-involved rape: Increase in beer tax will not affect probability of these crimes. Drug- or alcohol-involved robbery: Higher beer taxes may reduce probability. Coefficient of beer taxes is negative and significant in the LPM models.	**Limitations** • Focuses on taxes rather than consumption to reduce violence. • Does not consider causality between substance use and violence so consumption is replaced in the equation. **Reported conclusions (by authors).** • Increasing beer tax will decrease probability of assault but have no effect on robbery and rapes/sexual assaults. • A 1% increase in beer tax will decrease assaults by 0.45%.
Markowitz (2005) USA	Correlational study	**Study Sample** 1992,1993,1994 National Crime Victimization Surveys (NCVS)	**Outcome Measures** Assault; Rape/sexual assault; robbery	Tax on beer negatively associated with likelihood of assault. A 1% increase in beer tax will decrease the probability of being a victim of assault by a range of 0.03-0.05% Higher alcohol prices do not have an effect on probability of rape/sexual assault. Increasing tax on beer appears to have no effect on likelihood of robbery.	**Limitations** Most serious crime recorded in cases of multiple crimes thus under-reporting crime. Data also subject to recall error **Reported conclusions (by authors).** Higher beer taxes decrease probability of assault and alcohol- or drug-involved assault, but not rape or robbery.
Markowitz et al (2003)	Correlational study	**Study Sample** Data on completed	**Outcome Measures** Completed youth suicides 10-24 yrs.	Increases in excise tax on beer are associated with a reduced number of male suicides. This tax however has no impact on female suicides.	**Limitations** Does not take into account impact of depressive orders on suicides. Need to consider role of illegal drugs.

USA		suicides for each state in USA (1976-1999)	**Data analysis** Negative binomial regressions used to estimate reduced form model of youth suicide. Suicides analysed by gender and age groups.	Across all age groups increases on excise tax on beer are associated with reductions in male suicides. For youngest males a ten per cent increase in beer tax will lower the average number of suicides by 5.0%. For older age groups a ten per cent increase in beer tax will lower average number of suicides by 3.1% (15-19 yrs) and 2.4% (20-24 yrs) For each age group a 1 per cent increase in state capita number of gallons consumed is associated with approximately 1% increase in male suicides.	**Reported conclusions (by authors).** Policies designed to reduce alcohol consumption may be successful in reducing male suicides but such policies have little impact on female suicides.
Mast, Benson & Rasmussen (1999) USA	Cross-sectional data	**Study Setting** Data of fatalities from 1984 to 1992. Data from 7 countries Australia, Canada, Finland New Zealand, Norway, Sweden, UK (1955-1985)	**Data analysis** Beer-consumption model of the relationship between beer taxes and consumption A reduced-form model. Regression estimates – OLS and fixed-effect regressions.	Beer taxes have a small impact on consumption and heavy drinkers are the least responsive to price. The tax relationship is not robust across data periods and that is possibly due to missing variable biases.	**Limitations** • Potential bias for tax coefficient due to lack of control for determinants of attitudes toward beer tax policy. Additional research on the determinants of beer taxes is needed. **Reported conclusions (by authors).** Taxes are an important determinant of alcohol consumption.
McCarthy (2003) USA	Cross-sectional analysis and econometric models	**Study Setting** 58 counties in California over an 18-year period. **Sample at Baseline** A total of 1,024 observations	**Study Sample** Panel dataset that includes each county in California and spans an 18-year period 1981-1998	Factors that have large effects on older driver crashes are risk exposure, energy, alcohol prices, alcohol availability, and increased speed limits on higher speed roads. Elasticity estimates**:** Fatal crashes are an order of magnitude more sensitive to changes in gasoline and alcohol price indexes than are less serious crashes. Consistent with alcohol price sensitivity, fatal crashes among older drivers are more than twice as sensitive to alcohol availability.	**Limitations** • Variables for crashes involving older drivers differ from that variable for crashes involving younger drivers. • Additional research needs to be done to better understand the tradeoffs and empirical importance in using alternative panel data estimation techniques. • The estimation results were broadly, but not uniformly, consistent with the results reported in these tables. • Further study needed to establish relationships between effects on crash levels versus crash rates.

				e.g. A 4% increase in the number of retail outlets results in an approximate 1% increase injury and property damage only crashes but a 2% increase in fatal crashes among older drivers.	**Reported conclusions (by authors).** • Increase in gasoline and alcohol taxes can provide safety benefits in reducing fatal crashes involving older drivers. • Reducing number of establishments that sell alcohol will reduce number of crashes involving older adults.
Mullahy & Sindelar (1994) USA	Regression analysis	**Study Setting** To analyse the role of sociodemographic factors and its influence on drunk driving **Sample at Baseline** N = >43,000	**Study Sample** Self-reported drunk driving data from the 1998 National Health Interview Survey 24% male drinkers 12% female drinkers. **Data analysis** Estimating drunk driving propensity. Probit regression analysis	Key policy variables: minimum fine for an offence, state excise tax on beer and license revocation of drunk driving. The demand curve for drunk driving is negatively sloped.	**Limitations** ▪ Caution with self-reporting bias in the state level data. ▪ Demand for drunk driving depends on individual's knowledge of the full price of drunk driving. ▪ Individuals may not be fully informed of the consequences of driving under the influence of alcohol. **Reported conclusions (by authors).** State-level policy variables are significant in deterring drunk driving.
Ohsfeldt & Morrisey (1997) USA Tax to harm	Model	**Study Setting** Data used from 1975-1985.	**Data analysis** Reduced-form injury model.	The estimated beer tax coefficient in the injury model is negative and statistically significant. The beer tax coefficient is estimated to be -22.7. Therefore, a 10% increase in beer tax would result in a decrease of reported lost-work days by 2.27 days for every 100 FTE employees due to injury. Industrial injury Beer coefficient is negative and statistically significant for all industry groups. Estimated elasticity is -0.17 (10% increase in beer tax is associated with 1.7% decrease in work-days per 100 FTE employees). Injury-related lost days at work A 25% increase in beer tax in 1992 is estimated to decreased lost work days by 4.6 million days and reduce productivity by $491 million. Fatal injury tax elasticity is -0.085. A 25% increase in beer tax in 1992 would reduce fatalities by 240 lives.	**Limitations** None identified **Reported conclusions (by authors).** • Higher beer taxes would reduce serious non-fatal industrial injury.

Parry et al (2006) USA	Econometric modelling	**Data Sources** Uses data on total alcohol consumption, excise taxes and drunk-driver incidents	**Outcome Measures** Drink driver costs and penalties Heavy drinking costs Labour supply elasticities Alcohol elasticities	Taking into account cross-price elasticities optimal tax for beer is 13 per cent to 360 per cent greater than for wine. Conversely optimal tax for spirits is 53 to 93 per cent of that for wine. [Contrast with spirits being taxed more heavily than wine and beer].	**Limitations** None identified **Reported conclusions (by authors).** Strong case for shifting from labour-related taxes to alcohol related taxes. Higher alcohol taxes should be seen as a complement to, not substitute for, stiffer drink-driving penalties – the latter yield greater welfare benefits.
Ponicki et al (2007) USA	Predictive Model	**Study Setting** United States	**Study Sample** Panel data from 48 USA states over period 1975-2001 **Outcome Measures** Youth traffic fatalities **Data analysis** Age-group analyses control for pre-identified variables and fixed effects account for unexplained cross-sectional and time-series variation.	Beer tax rates have a negative impact upon youth fatalities although the direct impact drops by half when minimum legal drinking age is factored in.	**Limitations** None identified **Reported conclusions (by authors).** Raising either Minimum Legal Drinking Age or beer taxes in isolation led to fewer youth traffic fatalities. Effectiveness of each policy declines as other forms of availability become more restrictive.

Ruhm (1996) USA	Econometric analysis	**Study Setting** 48 states over 1982-1988 **Sample at Baseline** n = 336	**Outcome Measures** Effect of beer taxes on motor vehicle fatalities **Data analysis** Fixed-effect models	Estimated elasticities of night-time driver fatalities and beer taxes are between -0.21 and -0.18.	**Limitations** None identified **Reported conclusions (by authors).** • Most regulations have little or no impact on traffic mortality. However beer taxes are associated with reduced car fatalities. • Higher beer taxes appear to reduce vehicle deaths and the parameter estimates obtained from fixed effects models are relatively insensitive.
Saffer (2001) USA	Cross-sectional study and regression analysis	**Study Setting** 1991 National Household Survey on Drug Abuse (NHSDA) **Sample at Baseline** 32,000 observations	**Study Sample** USA household population aged 12 or older and contain information on data criminal behaviour and socioeconomic characteristics. **Outcome Measures** Effects of substance abuse control on crime. **Data analysis** Probit regression	Increased drug control reduces arrests, property damage, and drug sales. Increased beer taxes are shown to reduce arrests, property crime and property damage. Controlling beer taxes have twice the effect on reducing property damage by youth than for the entire sample.	**Limitations** • Unmeasured individual specific characteristics in the data. • Omission of enforcement data and measurement error in the self-reported crime data. **Reported conclusions (by authors).** • Increased drug control spending and increase beer taxes can reduce crime especially for individuals under age 21.
Sen (2003) USA	Model	**Study Setting** USA states	**Study Sample** State-level data for 15–19-year-old women for 1985, 1988, 1992, and 1996. **Outcome Measures** Teen abortion rates; Teen birth rates	Higher beer taxes have statistically significant negative effects on teen abortion rates, though magnitudes of effects are quite small. Effects on birth rates are not statistically significant.	**Limitations** Smallness of panel imposes constraints on statistical methods used **Reported conclusions (by authors).** Increased beer taxes may help prevent some unwanted pregnancies that would typically be terminated via abortions rather than culminating in live births. However, the small magnitudes of the effects strongly caution against relying on increased beer taxes to noticeably reduce teen pregnancy rates.
Sen (2006) USA	Cross-sectional time series analysis	**Study Setting** Pooled data from all states and the District of	**Study Sample** State-year level data on fatal injuries for children between 0-9 years	Child homicide deaths are sensitive to alcohol prevalence: A 1% increase in such prevalence leads to a 1.08 increase in child homicide deaths and 1.20% increase in homicide and undetermined intent deaths.	**Limitations** • There may be underreporting of homicide deaths. • From data, it is not known whether child homicide deaths are caused by parents of relatives/aquatints or by strangers.

		Columbia over 1981-2002 Child deaths from Web-based Injury Statistics Query and Reporting System (WISQARS)	**Outcome Measures** To investigate the relationship between beer taxes (other alcohol policies) and child deaths. **Data analysis** Negative binomial regression model.	Beer tax rates have a significant and negative relationship with child homicide deaths. A $1 increase in beer tax will reduce child homicide deaths by 24-25%. Elasticities calculated show that a 1% increase in beer taxes reduces deaths by 0.28-0.29%. An inverse relationship exists between per gallon beer taxes and child homicide deaths (elasticity -0.19) whereas the relationship is direct between alcohol retail outlet density and child homicide deaths (elasticity 0.16).	• Effect of prices of other drugs that may complement alcohol consumption and affect violence against children were not investigated. • Could not control changes in the quality of law enforcements and child welfare states which may affect estimated results. **Reported conclusions (by authors).** • Higher beer tax rates and lower retail outlet density are significantly related to reductions in child homicide deaths. • Responsiveness of child homicide deaths and increases in beer taxes and decreases in retail outlet density seems relatively inelastic. • A 10% increase beer taxes (per gallon) or 10% decrease in retail outlet density would reduce child deaths by 1.1-1.6% and 1.3 and 1.9%, respectively. Stricter alcohol policies would have to be substantial for homicide rate to be significantly reduced.

Table 5 Studies linking pricing to Harm

Authors Country	Study Design	Sample and Interventions	Methods	Harm Outcomes	Limitations and Conclusions
Adrian et al (2001) Canada 713 Price to harm	Cross-sectional and time-series analysis	**Study Setting** Cross-sectional data for 49 counties of Ontario for 1989 and time series analysis for 1972-1990	**Outcome Measures** To determine relationship between price of alcohol and drunk driving **Data analysis** Econometric multiple regression techniques	**Price to harm** Time-series analysis (1972-1990) Positive correlation between price of alcohol and alcohol-involved traffic accidents. There is also a positive but not significant correlation between alcohol price and alcohol-involved traffic offences. There is however, a negative and significant correlation between price and changes in accidents and offences. Multiple regression analysis The price of alcohol has a significant and negative effect on accidents. The price of all alcoholic beverages has a significant negative effect on alcohol-involved traffic offences. The price elasticity of alcohol-related motor vehicle accidents was -1.2 (elastic). The price elasticity of traffic offence was -0.5 (inelastic). **Consumption to Harm** Cross-sectional analysis Positive correlation between alcohol consumption and alcohol-involved traffic crashes or traffic offences. Also positive correlation of high risk consumers and alcohol crashes or alcohol offences. Time-series analysis Strong correlation between alcohol consumption and both alcohol involved traffic offences and alcohol involved traffic	**Limitations** • The individual effects of prices of beer, wines and spirits were not determined. **Reported conclusions (by authors).** • Cross-sectional data for 1989 found a positive and significant relationship between alcohol consumption and alcohol-involved accidents and alcohol-involved traffic crashes. • There is a negative correlation in alcohol price and alcohol-involved traffic accidents and offences. • In the multiple regression technique, there is a negative and significant relationship between price and accidents and price and offences. • Elasticity values of calculated price and alcohol-related accidents and offences were within the ranges found in other USA studies (Kenkel 1993).

				accidents. Positive correlation in consumption and change in alcohol-involved traffic offences or accidents.	
Cameron & Williams (2001) Australia			**Study Sample** Individual data for non-institutionalised civilian population 14 yrs and older from National Drug Strategy Household surveys **Outcome Measures** Own price effects and cross price effects of alcohol, cannabis and cigarettes	Alcohol is own price responsive. 10% increase in alcohol price decreases participation by 3.8%. 10% increase in alcohol price increases cannabis use by 4.2% (statistically significant).	**Limitations** Reports effect of South Australian liberalisation of cannabis laws – also complementary use of alcohol and cannabis. Very small sample & unclear what the respective baselines are (if few cannabis users, then 4% increase may not be problematic) **Comments** Method for standardising price based on Saffer and Chaloupka (1995) **Reported conclusions (by authors).** Participation in licit and illicit drugs is price sensitive. Cannabis and alcohol are substitutes. Alcohol and cigarettes are complements
Decker & Schwartz (2000) USA	Econometric study		**Study Sample** 474,096 individuals from 45 states in USA. **Outcome Measures** Own and cross-price elasticities. **Data analysis** Uses individual-level data from Behavioral Risk Factor Surveillance System to investigate cigarette and alcohol consumption. Uses standard demand model of alcohol and cigarette consumption.	Significant cross-price effects. Higher alcohol prices decrease both alcohol consumption and smoking participation (suggesting complementarity). Higher cigarette prices tend to increase drinking.	**Limitations** None identified **Reported conclusions (by authors).** Further work needed to understand social and economic relationship between cigarette and alcohol consumption.

Farrell et al 2003 USA Heavy drinkers	Econometric study	**Data Sources** Data on symptoms of alcohol dependence and abuse and on relevant personal characteristics obtained from the National Longitudinal Alcohol Epidemiologic Survey (NLAES), nationally representative sample survey of general population of USA. Data on price of alcoholic beverages obtained from Inter-City Cost of Living Index published by American Chamber of Commerce Researchers Association (ACCRA) which reports market prices (excluding sales taxes but including federal and state excise taxes) in more than 200 cities. Data on state sales taxes on alcoholic beverages obtained for wine and beer.	**Outcome Measures** Consumption **Data analysis** Three-part econometric model is used to estimate the impact of price on three latent dimensions (factors)	For heavier drinking, estimated price elasticity is −1.325 (*P*=0.027); for physical and other consequences of drinking, −1.895 (*P*=0.003); for increased salience of drinking, −0.411 (*P*=0.339). For a single latent factor characterized simply as dependence/abuse, estimated price elasticity is −1.487 (*P*=0.012).	**Limitations** Ideally, estimation would use pooled cross-sectional or panel dataset to control for stable factors correlated with alcohol prices/consumption. No such suitable dataset exists suitable for pooling with NLAES data. NLAES data are retrospective, self-reported, and exclude homeless and institutionalized. Underestimation of prevalence of symptoms of dependence and abuse. Prevalence subject to recall bias which given stigma are likely to yield underestimates of prevalence and severity. Regression estimates take into account unequal selection and cluster sampling. Inferences based on these estimates are appropriately conservative. Does not allow for stratification of primary sampling units prior to selection. Inferences based on estimates (unadjusted for stratification) may be conservative. Only includes some policies available to governments (e.g. excludes density of outlets or hours or locations of sale) Potential bias if measures correlated with price and affected drinking behaviour or symptoms. Bias probably minor, because several major alcohol control policies had negligible impact on results. **Comments** Estimates impact of price of alcoholic beverages on latent dimensions of current alcohol dependence and abuse.

					Reported conclusions (by authors). Higher prices for alcohol reduce important dimensions of current alcohol dependence and abuse.
Goudie et al (2007) UK	Hypothetical experiments	**Study Sample** 40 current polysubstance misusers (29 males, 11 females; mean age 23.8)	**Study Method** Participants asked to hypothetically purchase drugs from price list of alcohol, amphetamine, cannabis, cocaine and ecstasy at different levels of quality and price (i.e. better quality drugs cost more money). Disposable income available was systematically varied to determine impact of income on decision to purchase drugs.	Demand for both normal alcohol and strong alcohol was income inelastic.	**Limitations** Hypothetical drug purchasing decisions and self reported drug preference **Reported conclusions (by authors).** Like other products, controlled drugs are purchased based on consumer's interpretation of their relative value. It is probable that purchase and subsequent use of controlled drugs by polysubstance misusers will be heavily influenced by economic environment.
Gruenewald et al (2006) USA	Econometric modelling	**Study Setting** Sweden **Study Sample** Swedish price and sales data provided by Systembolaget (1984-1994)	**Outcome Measures** Own price effects and cross price effects **Data analysis** Sales were detrended and deseasonalised prior to analysis. Seemingly unrelated regression equations used to model impacts of price increases within 9 empirically defined quality classes across beverage types. Models enabled statistical assessments of both own-price and cross-price effects between types and classes.	Consumer behaviour is responsive to changes in prices. Rather than reducing consumption drinkers switch to lower cost brands to maintain their consumption. Quality/quantity trade-offs exist within a beverage type and across beverage types. Results showed that consumers respond to price increases by altering their total consumption and by varying their brand choices. Significant reductions in sales were observed in response to price increases, but effects mitigated by significant substitutions between quality classes. Findings suggest net impacts of purposeful price policy to reduce consumption will depend on how such policies affect range of prices across beverage	**Limitations** • Sales used as proxy for consumption. • Price series were unweighted averages of brands within each quality class meaning that brand with low sales was as influential as high-selling brand. • Excludes low alcohol brands which were not sold through outlets • Excludes illegal production. • Does not analyse differential effect of quality. • Does not use symmetry of cross-price effects. • Only looks at demand side of market. **Reported conclusions (by authors).** Concentrating on inexpensive forms of alcohol is more likely to restrict sales by preventing substitution. Manufacturers maintaining several brands may adjust pre-tax prices to maintain prices for low-end beverages but raise them for high-quality brands. Price-posting may be a way of countering this. If younger or heavier drinkers focus disproportionally on low cost beverages increasing

					these prices may be particularly useful. Alcohol is composed of different beverage types (i.e., beer, wine, and spirits) and quality brands (e.g., high-, medium-, and low-quality beers). Consumers may make substitutions between different beverage types and brands in response to price increases. Availability of a broad range of beverage prices provides opportunities for consumers to mitigate effects of average price increases through quality substitutions; a change in beverage choice in response to price increases to maintain consumption. Assessed relationships between alcohol beverage prices, beverage quality, and alcohol sales and examined price effects on alcohol consumption
Hollingworth (2005) USA	Model	**Study Setting** USA residents in 2000. **Sample at Baseline** Cohort of 4,049,448.	**Study Sample** Young adults aged 20. **Outcome Measures** Use of Life table methods to calculate years of potential life lost (YPLL) **Data analysis** To model the impact of interventions on alcohol-attributable mortality.	Alcohol-related mortality was 55,259 accounting for 953,459 discounted YPLL. Price elasticity 0.28 alcohol participation 0.51 heavy episodic drinking A 17% price increase ($1 tax increase in beer), heavy drinking decrease to 24.4% for men and 13.1% for women. Estimated 1,490 alcohol-attributable deaths would be prevented and YPLL reduced by 31,130 (3.3%). Complete media advertisement ban would prevent 7,609 alcohol-related deaths that is 60% of adults (<50 years). A complete media ban would result in 156,413 fewer YPLL.	**Limitations** • Model looks at effect of interventions on heavy drinking only. Therefore increase in abstainers and mortality was not modelled. • Years of life saved could be counterbalanced by the beneficial effects of alcohol. • 54% of deaths prevented by a tax increase occur before 50. However most deaths can be prevented later in life as a result of moderate drinking. • Tax increase and ad bans only affect consumption by 17-20 year olds and does not consider harmful drinking habits later in life. • Excluded alcohol-attributed deaths in persons less than 20 years and over 80. **Reported conclusions (by authors).** • Increase in alcohol excise could have modest effects on alcohol-related mortality and YPLL. • Together with media ban on alcohol advertisements would be slightly more effective. • Policy: partial media intervention includes

					taxation of advertising expenditures, eliminating tax deductibility of advertising, limiting advertising exposure in high0risk age groups.
Kenkel (1993) USA 5151	Model	**Study Setting** Data from Health Promotion and Disease Prevention (HPDP) self-reported survey in 1985. **Sample at Baseline** 12,000 males 16,000 females	**Outcome Measures** To estimate the effects of policy variables on heavy drinking and drunk-driving. A price estimate of alcoholic beverage prices was from American Chamber of Commerce Researchers Association (ACCRA). **Data analysis** Tobit model used to find changes in the amount of heavy drinking.	Reports large price elasticities for number of days with five or more drinks in the past year, another standard measure of heavy consumption:-0.92 for persons of all ages and -2.24 for youth between 18-21. Taxation and public education could be effective in reducing heavy drinking. The price variable has a negative and statistically significant effect on the amount of heavy drinking. Male price elasticity = -0.71 Female price elasticity = -1.14 Cross-price elasticity of the demand for drunk driving is -0.71 for males and -0.81 for females. Increasing awareness of the health consequences could decrease heavy drinking by 12 and 10% for male and females, respectively. Social costs and costs to drunk drivers net of fines is $992.12 million. Reduction in social cost of 23% increase in price of alcohol estimated at $94.38 million.	**Limitations** • Reliability of use of self-reported heavy drinking and drunk-driving is questionable. **Comments** Young drinkers are quite sensitive to price. Strong positive association between measures of heavy drinking and reported number of occasions of drunk driving in the past year. Provides plausible explanation for negative relationship between fatal motor vehicle crashes and the price of alcohol. **Reported conclusions (by authors).** • Deterrence policies and alcohol control policies including taxation are effective to reduce heavy drinking and drunk driving. • Deterrence policies such as mandatory jail terms, administrative licence suspensions, and preliminary breath tests could decrease drunk driving by ~30%.
Markowitz (2000) USA	Correlational study	**Study Setting** United States	**Study Sample:** Data from 1985 cross-section and 1985-1987 panel of National Family Violence Survey **Outcome Measures** Wife abuse and Husband abuse	Increase in price of pure alcohol (as measured by a weighted average of the price of beer, wine and alcohol, will reduce violence aimed at wives. Evidence for a link between increase in price and lower husbands is more equivocal.	**Limitations** None identified **Reported conclusions (by authors).** A 1% increase in price in pure alcohol would decrease the probability of being a victim of wife abuse by 5.34% (95% CI -1.0% to -9.7%)

			Data analysis A reduced form violence equation is estimated and individual fixed-effects model used to control for unobserved characteristics in the panel.		Raising the price would penalize people who consume alcohol but are not violent.
Markowitz (2000) USA	Model	**Study Setting** Data from the 1989 and 1992 International Victimization Surveys. **Sample at Baseline** Approximately 50,000 respondents in 16 different countries. 1989 survey consists of ~2000 respondents in each of the 14 countries 1992 survey covers 18 countries.	**Outcome Measures** To study the direct relationship between price of alcoholic beverage and occurrences of criminal violence in different countries. Respondents asked if they had been victims of three types of violent crimes in the past year. **Data analysis** Estimation of a reduced form model to determine effects price of alcohol on the probability of being a victim of crime.	Results suggest that higher alcohol prices lead to lower incidences of violent crime (robbery, assault and sexual assault). A 1% increase in the calculated price of alcohol will lead to: 0.27% decrease in the probability of robbery 0.30% decrease in the probability of assault 0.21% decrease in the probability of sexual assault A 1% increase in tax will decrease probability of : Robbery by 0.19% Assault by 0.24% Sexual assault by 0.15%. The tax coefficient is negative and significant which suggests that an increase in the tax on alcohol will lower the probability of being a victim of robbery. Inclusion of other regulatory variables such as higher legal blood levels lead to more robbery whereas control on advertising will lead to less robbery. Conclusions of the probability of being assaulted are similar to the models of robbery. The coefficient is negative and significant with price or tax.	**Limitations** • Price and taxes are calculated rather than observed directly. **Reported conclusions (by authors).** • Increasing price of alcohol can be effective policy tool in reducing violent crime. • Rate of robbery, assault and sexual assault against women can be lowered by increasing either price or tax on alcohol. • A 1% increase in price will decrease probability of robbery, assault and sexual assault by 0.27%, 0.30% and 0.21%, respectively. • A 1% increase in tax will decrease probability of robbery, assault and sexual assault by 0.19%, 0.24% and 0.15%, respectively.

				Increase in price of alcohol will reduce the probability of sexual assault. The effect of other regulatory variables to reduce sexual assault is unclear. Neither advertising bans nor higher MLDA will reduce probability of sexual assault against women.	
Petry (2001) UK	Hypothetical experiments			As price of alcohol rose alcohol purchases decreased and demand for alcohol was inelastic. Cocaine was complement to alcohol but other drug purchases were independent of alcohol purchases. As price of cocaine increased alcohol was a substitute for cocaine but other drug purchases did not change significantly.	**Limitations** Hypothetical drug purchasing decisions Self reported drug preference. **Reported conclusions (by authors).** Among alcohol abusers, cocaine is a complement to alcohol but alcohol is a substitute for cocaine.
Ruhm (1996)[9] USA	Design	**Sample at Baseline** Aggregate data 1982-1988	**Outcome Measures** Motor vehicle crash fatalities	Higher beer taxes significantly reduce motor vehicle crash fatalities	**Limitations** None identified **Comments** Used variety of models to account for potential omitted variables biases. (Omitted variables biases arise if determinants of fatal crashes are not included in regression model and are correlated with variables used to predict these crashes.)
Sivarajasingam et al (2006) UK	Correlational study	**Study Setting** All 10 economic regions of England & Wales **Sample at Baseline** 58 emergency departments (1st May 1995-30th April, 2000)	**Study Sample** 353, 443 violence-related A&E attendances **Outcome Measures** Violence-related injury rates **Data analysis** Panel estimation and multi level modelling used to examine association between variables, and to minimise ecological fallacy.	High regional violence-related rates correlated with low real price of alcohol as measured by price of beer. Rates of violence were higher during summer months and on days of major sporting events.	**Limitations** • Real beer prices are used as a proxy for alcohol prices in general. • Regional beer prices from CAMRA were modelled econometrically to ONS national average to establish missing data for other 11 months. **Comments** Authors derive implications for increasing tax on beer and "voluntary controls by the drinks industry enforced by local authorities" that are not based directly on study data.

					Reported conclusions (by authors). Calculating impact based on mean values suggests that a 1% sustained increase in price of alcohol will decrease violent injuries by nearly 2200 a month in England and Wales. Results based on effects of Euro96 (football) and 1999 Rugby World Cup suggest these two events contributed nearly 1300 extra violent injuries.
Sloan, Reilly & Schenzler (1993) USA	Regression Analysis	**Study Setting** Mortality data from public use tapes for 48 states (1982-1988) by the National Center for Health Statistics	**Study Sample** 304 observations with alcohol price (48 states x 7 years) Analysis of persons aged 25-64. Estimated alcohol prices (per bottle to gallons) by the American Chamber of Commerce Researchers Association (ACCRA) **Outcome Measures** Effects of price and availability of alcohol, civil and criminal deterrents and other policies on mortality. **Data analysis** Alcohol price index instead of measures of state alcoholic beverage taxes. Regression analysis to investigate the effects of public policies on alcohol-related death levels.	Examined suicide. Concluded that higher alcoholic beverage prices and reduced alcohol availability would lower homicide rates. The effect of alcohol price on traffic accident mortality is almost statistically significant. Alcohol price (r = <0.3) has statistically significant and negative effects on suicides. Alcohol price has a negative and statistically significant effect on contributory cause mortality except for falls, fires and other accidents.	**Limitations** • ACCRA price data are estimates only. • Consumption data is at the home. • Regression analysis cannot prove the causation of alcohol-related deaths. **Reported conclusions (by authors).** • Alcohol prices have some effects on mortality but not for primary cause deaths. • A combination of public policies may reduce alcohol-related mortality such as increased alcohol price, dram shop laws, death penalty and increased policing.
Stout et al (1999) USA	Longitudinal study (1984-1995)	**Study Setting** Data from the Behavioral Risk Factor Survey (1984-1995) **Sample at Baseline**	**Outcome Measures** Effect of price, administrative law, criminal law, tort law and insurance, individual and state characteristics on decision to engage in binge drinking.	Price had a negative effect on the probability of heavy episodic drinking and driving among drinkers but the effects were not statistically significant. An increase in bar density increased	**Limitations** Outcome of other variables such as effect of criminal law, tort liability, demographic and health behaviours and state characteristics are not described.

Price/Advertising to consumption and harm		Observations of heavy episodic drinking (n = 86,273), drinking and driving (n = 87,087), drinking and driving among heavy drinkers in the month prior to the survey (n = 22,261)	**Data analysis** Logit analysis to estimate equations of probability of a person engaged in heavy episodic drinking, and also drinking and driving.	probability of heavy episodic drinking as well as the probability of drinking and driving among drinkers and heavy drinkers. The probability of harmful alcohol behaviour fell as the density of liquor stores increased. Restrictions on liquor store advertising of price significantly reduced the probability of drinking and driving among all drinkers. It is expected with price advertising, that prices are likely to fall and thus lead to increased alcohol consumption. Advertising and availability of alcohol promote risky alcohol behaviours supporting similar and previous research.	**Reported conclusions (by authors).** • Several criminal and administrative regulations were effective in reducing heavy episodic drinking and drunk driving especially the addition of tort liability to the alcohol-control policies. • Price had negative effects on probability of heavy episodic drinking and drinking and driving among heavy drinkers but effects were not statistically significant
Sumnall et al (2004) UK	Hypothetical experiment			As price of alcohol rose price was inelastic. Amphetamine was a substitute for alcohol, cocaine was a complement drug and ecstasy was independent.	**Limitations** Hypothetical drug purchasing decisions Self reported drug preference **Reported conclusions (by authors).** Alcohol drug of choice when economic considerations were brought into play.

Trolldal and Ponicki 2005 USA 557	Design Time-series cross-sectional analyses	**Study Setting** 50 states over 18 years **Sample at Baseline** Control and license states in United States during 1982–99.	**Outcome Measures** Price elasticities **Data analysis** • Elasticities were estimated using a multiplicative model based upon first-differences of time-series within states. • Disposable income and other socio-demographic variables were used as control variables. All data were obtained from archival sources.	Demand for spirits and beer significantly more sensitive to price changes in license states than in control states. Estimated price elasticity for wine sales was somewhat larger in license states, but not significantly so.	**Limitations** Not identified **Comments** Addresses hypothesis that regulated market leads to higher transaction costs associated with purchasing alcohol, which increases full price of beverages (nominal cash price plus transaction costs). Cash price of alcohol represents a smaller part of full price in a highly regulated market. Assuming that customers respond primarily to changes in full price,demand for alcohol should be less sensitive to changes in cash price where regulation is stricter. Examined whether variations in price elasticities were a function of different regulatory systems. **Reported conclusions (by authors).** Lower price elasticities for spirits and beer in the control states support hypothesis that customers respond primarily to changes in full price of alcohol
Young & Likens (2000) USA	Predictive modelling	**Study Setting** Data from 48 states over 9 years and consider total, youth, and alcohol-involved fatalities		None of the beer tax or price coefficients is significantly different from zero. Magnitudes of estimated effects are much smaller than reported in some previous studies. Found no evidence for effects of taxation and price on alcohol consumption and alcohol related traffic fatalities among general population	**Limitations** • Focusing only on beer taxes can lead to mistaken policy interpretations as estimates will overstate impact that raising just beer taxes would have on fatalities. • Events on which estimates are based involve simultaneous changes in taxes on all three types of beverages. **Comments** • If, policy makers increase just beer taxes, impact is smaller because there would be no direct effect on wine or liquor drinkers and because beer drinkers tend to substitute liquor or wine

					for beer. • Total consumption of alcohol is likely to decline less if just beer taxes are increased. **Reported conclusions (by authors).** • Examines relationship between motor-vehicle fatalities and alcohol taxes, prices, and various drinking laws. • Seatbelt laws, minimum legal drinking age, and dram-shop laws typically have statistically significant, negative relationships with fatalities. • Other variables (including preliminary breath tests and mandatory penalties for driving under the influence) are imprecisely estimated and are usually not statistically significant.
Young and Bielinska-Kwapisz (2006) USA Price to harm	Model	**Study Setting** Data from 48 contiguous states (1982-2000) **Sample at Baseline** 869 observations	**Outcome Measures** Examines relationships among alcohol prices, consumption and traffic fatalities **Data analysis** Regression model	Using alcohol taxes as instrumental variables, fatalities are found to be negatively related to prices. In addition, alcohol consumption is strongly positively related to fatalities. Increases in alcohol prices are positively associated with traffic fatalities. A 10% increase in alcohol prices is predicted to reduce total fatalities by 5.8%. A 10% increase in per capita alcohol consumption is associated with a 9.9% increase in fatalities. Elasticity with respect to the price of alcohol: Adults = -0.3 Teens = -0.2	**Limitations** • Estimates should be considered with caution because minority of all fatalities involve alcohol. **Comments** Previous studies have found large, negative associations between alcohol *taxes* and fatalities. However, commonly-used price data suggest little or no connection between alcohol *prices* and fatalities. These apparently conflicting findings may result from measurement error and/or endogeneity in price data, which biases ordinary least squares estimators toward a finding of no price effects. **Reported conclusions (by authors).** • Increased beer tax of 50 cents per six pack of beer would reduce fatalities by 4.5%. This amounts to 1900 lives saved in year 2000.

Review 2: The effect of promotion on alcohol consumption

2.1 Introduction

Alcohol occupies a prominent place among branded consumer goods. Alcohol products are particularly attractive to young people who see them as a way of signalling their adult identity and their entrée into adult society. Producers and marketers of alcohol are using increasingly sophisticated promotional mechanisms. Unintended effects of otherwise legitimate marketing strategies may include underage drinkers starting to drink, regular young drinkers becoming prone to binge drinking patterns and established young drinkers accruing a heavy level of consumption which can place them at risk of harms (Academy of Medical Sciences 2004).

Sophisticated and innovative promotional marketing mechanisms usually operate in advance of rigorous academic research and evaluation. As a consequence, there is a large evidence base, although comprised mainly of study designs that are unable to demonstrate a causal effect, around established channels such as the mass media but a shortage of studies evaluating newer media such as the internet and mobile phones. Generally, the vast array of channels and of types of promotional activity (Jernigan and O'Hara 2004) make it difficult to isolate individual effects, and thus target individual strategies, even though they consistently demonstrate an aggregative effect. Policy options should therefore recognise where a common underpinning mechanism exists and apply general principles to target such a mechanism in anticipation of new channels rather than continually attempt to respond to specific evidence on every new medium. This takes account of the fact that promotion is never static, even in established markets, as new cohorts of young people, with new media preferences, become targets for marketing activity as they mature (Saffer 2002).

2.1.1 Structure of this review

This review begins by considering an important meta-analysis that examines the impact of advertising on consumption in general (Section 2.2). It then proceeds to examine the more micro effect of advertising and promotion on consumption (Section 2.3) focusing firstly on the substantial quantity of research that exists around mass media evidence (e.g. TV, press), before looking at work on the use of promotional items (e.g. T-Shirts). Section 2.4 examines measures put in place to restrict advertising (either total bans or partial restrictions). Finally Section 2.5 considers measures that might be put in place to attempt to respond to the effect of advertising such as counteradvertising and public service announcements (to follow).

2.1.2 Summary of quantities of evidence by topic

This review attempts to include both significant primary studies and the results of systematic reviews. The following table reports the respective yield for the major sections of this report.

Table 6 Number of studies included and covered (Review 2)

Section	*Number of studies included*	*Number of studies covered*[a]
Advertising in general (Section 2.2)	2 systematic reviews and meta-analyses	132 econometric studies and 7 cohort studies
Specific advertisements and promotions (Section 2.3)	57 and 1 meta-analysis	65
Bans and other restrictions (Section 2.4)	10	10
Counter Advertising and Public Service Announcements (Section 2.5)	To follow in final report	To follow in final report
Total	70	207

[a]This includes studies accessed via the results of large meta-analyses or studies that, due to logistic constraints or agreed limitations of the scope of this review (e.g. date, language etcetera), are not included in the accompanying evidence tables.

2.2 Measuring the impact of alcohol advertising

Gallet's (2007) meta-analysis of 132 studies reporting elasticities has already been analysed in the section on price and consumption. As previously mentioned his meta-analysis is of reasonable quality and certainly superior to any such analysis possible within the time and resource constraints of these reviews. In addition to data concerning price elasticities, Gallet reports data on advertising elasticities (322 values). Again special emphasis is given to studies conducted in a UK setting or to those completed subsequent to his data collection.

A further systematic review specifically looking at the link between alcohol advertising and consumption in young people was conducted by Smith and Foxcroft (2007).

Details of studies

132 studies are included in Gallet's (2007) meta-analysis. All studies were published in English, with the earliest being published in 1945 and the most recent in 2003. The majority of studies were conducted in the USA. An initial search of Econlit was supported by follow up of references from traditional narrative reviews and from included studies, and supplemented by internet searches. Advertising elasticities were used as the units of analysis.

In their systematic review of the effect of advertising on youth alcohol consumption Smith & Foxcroft (2007) found 7 cohort studies from a variety of settings including USA, Belgium and New Zealand.

Outcomes

In the Gallet (2007) meta-analysis studies measured advertising elasticity using a variety of methods for specifying alcohol demand. In the Smith and Foxcroft (2007) review outcome measures for alcohol consumption included any alcohol use in the past month, any alcohol use in the past year, drinking frequency, drinking frequency at specific locations and alcohol use whilst going out.

Results

Gallet (2007) reports median advertising elasticities for beer (0.020); wine (0.007); spirits (0.070) and alcohol (0.032). An advertising elasticity for Beer of (0.020) means that for every 10% increase in advertising expenditure, the expenditure on beer increases by 0.2%.

Findings from the systematic review by Smith and Foxcroft (2007) demonstrate a consistent picture of the association of advertising with initiation, consumption and heavy drinking. Specific findings included the following:

- Males who reported being aware of more alcohol advertisements at age 15 drank significantly more beer at 18 years. In beer drinkers aged 18, liking of alcohol advertising had a positive impact on beer consumed at age 21 years and they were more likely to be heavy drinkers at 26 years (New Zealand).
- In school children increased viewing of TV programmes with alcohol advertisements increased chance of beer consumption one year later (United States).
- Exposure to in-store beer displays significantly increased the chance of alcohol consumption two years later in adolescents (United States)..
- In 15 to 26 years olds in the USA, for each additional advertisement seen the number of alcohol drinks consumed increased by 1% (United States).
- In school children for each additional hour of TV viewing per day there was a 9% increased risk of initiating drinking 18 months later (United States).
- Increased hours of TV and music video viewing were associated with higher quantity of alcohol consumed one year later in school children (Belgium).
- School children were significantly more likely to have tried alcohol for the first time at follow-up at one to two years following greater exposure to alcohol portrayals in popular movies (United States).

It is interesting to note that these effects may be demonstrated for both under age and young adult drinkers and that they persist over a wide range of advertising channels that include both direct and indirect exposure.

Limitations
Studies included in the Gallet (2007) meta-analysis estimated advertising elasticities using high-level aggregates of advertising expenditure, mostly with short-run series. It needs to be borne in mind that this approach to estimating the effect of advertising does not differentiate between different form of advertising or groups of drinkers, and has been criticised on methodological grounds. Saffer (1996) argued that ". . . studies that use national data on annual alcohol advertising expenditures measure advertising at a high level [of aggregation] with little yearly change and are likely to find no effect on consumption" (Saffer, 1996, 266).

Cohort studies, as identified by Smith and Foxcroft (2007), can be prone to confounding and although some confounding variables were identified, the authors conclude that it is not possible to know if residual confounding influenced the analysis. Furthermore, they state that given the magnitude of the effect sizes shown in these studies, it is possible they were due to residual and unmeasured confounding.

A final limitation is that there is significant debate on whether advertising effects can be adequately estimated using the methodologies and data underlying the above studies. The main criticisms are: 1) oversimplification of consumer decision making process and disregard of the mechanisms through which advertising influences consumers, 2) the mismatch between marketing science and actual business: If the elasticity of advertising expenditure, as in Gallet, really lies between 0 and .07, why would any business spend such significant amounts on advertising? and 3) in a market where there is advertising saturation, it may be difficult to detect effects of marginally higher or lower advertising expenditures.

Evidence statement 5: There is conclusive evidence of a small but consistent association of advertising with consumption at a population level. There is also evidence of small but consistent effects of advertising on consumption of alcohol by young people at an individual level.

Evidence statement 6: There is an ongoing methodological debate on how advertising effects can and should be investigated and further research and methodological developments for establishing a definite causal relationship is required.

Gallet's meta-analysis is supplemented by consumer studies, which show that alcohol advertisements tend to lead to positive expectancies and attitudes about alcohol. Such consumer studies also provide increasing evidence that exposure to alcohol advertisements increases initiation of alcohol use amongst adolescents. These can be ranged alongside evidence from econometric studies with the majority finding a positive association between the volume of advertising and drinking behaviour and outcomes.

2.3 Specific types of advertising and promotion

2.3.1 Price & Point of Sales Promotions

A large proportion of on- and especially off-trade alcohol is sold "on deal", with expert estimates quoting that as much as 40-50% of all alcohol sold in supermarkets is sold whilst on promotion (personal communication May 2008). A considerable number of retailers offer promotional deals and 'happy hours' (temporary price-cuts) on products regularly consumed by young drinkers (see Hastings et al. 2005). Examples include: a never ending vodka glass (purchase one glass of vodka and refill it as often as you like); free first drink for girls, buy-one-drink and get one-free promotions, and cheap deals on popular drinks on particular nights of the week. Alcohol price promotions are associated with increased binge drinking (Kuo et al. 2003). Fisher (2005) models what he terms "happy hour economics" whereby monopolistic competition causes seasonal increases in demand which in turn lead to decreases in price.

All of the below studies consider the effects of price and promotions at the point of sale. A narrative synthesis is preferred here because of the heterogeneity of studies in this sample. No systematic reviews were found. This review therefore comprises 12 individual studies covering promotion-related interventions.

Details of studies
12 studies met the inclusion criteria. All studies were published in English, with the earliest being published in 2000. The large majority of studies were conducted in the USA, with isolated examples from the UK, New Zealand and Australia. Longitudinal studies were the most common design with other designs including surveys and audits. The studies varied in populations with their being several with considerable ethnic variation from a UK population. Some studies considered particular at risk groups such as under age drinkers, heavy drinkers and binge drinkers.

Outcomes
The most sophisticated measurement of outcomes was used in the study by Kuo et al (2003) which used an *off-premises establishment index score* which included a summed score of 5 items; sale of party balls or kegs, low sales price on 12 and 24-packs, any beer promotions and exterior and interior ads. They also computed an *on-premises establishment index score*, which included a summed score of 8 items: beer specials, special promotions in the following 30 days, low sale prices, interior and exterior signage, promotions, no interior or exterior signage of alcohol warning and any age verification policies. The two establishment indices were then combined to produce a single *total alcohol environment score,* with high scores indicating an "drink-friendly" environment. .

Results
Probably the most relevant study to this particular issue is that by Kuo et al (2003). This study does show the greatest sensitivity with regard to different elements of point of purchase promotion. This study found that campuses with higher off-premise establishment index scores had statistically significant higher binge-drinking rates. Similarly the on-premise establishment index score indicated that campuses with higher on-premise scores also had higher binge-drinking rates. Furthermore a significant correlation was found for the total environment score and college binge-drinking rates (r=0.49), past 30-day drinking rates (r=0.41), and past year drinking rates (r=0.35). In summary then the higher the alcohol environment score, the higher the percentage of binge drinkers, past-30-day drinkers or past-year drinkers on campus. The study by Pedersen (2002) also indicates that binge drinkers are likely to be differentially impacted by promotions albeit in a campus newspaper. A study by Babor et al (1978) which predates coverage of this review describes a drinking experiment recording quantity consumed during happy hour prices and when prices were regular. This study found that consumption increased significantly during the happy hour but returned to prior levels after the promotional period ended. The effect was found for both occasional and heavy drinkers.

Limitations
As shown in the introduction, a very wide range of promotional activity is used in alcohol marketing and many of these have not been researched. Any conclusions drawn from individual studies are necessarily dependent on the degree to which it is believed that a common mechanism or mechanisms exists between similar-looking promotions. This has important implications as to those promotions that are to be specifically targeted and as to how such promotions are defined, classified and grouped.

College students are most commonly studied and issues can be identified with respect to both the lack of representativeness and motivation to participate. As with many advertising and promotion studies, it is common to find participants being recruited through a marketing course. Thus, the study by Kuo et al (2003) focused on college students, although Hurtz et al (2007) have extended findings to cover school children. An important confounding variable is the omnipresence of extensive media advertising, which makes it particularly difficult to isolate in-store promotional effects.

Summary
The fact that the studies are so heterogeneous makes direct comparison difficult. There is evidence to suggest that promotional activity at the point of purchase has a significant impact on the likelihood for young people to consume alcohol and also to binge drink. However, causality cannot be inferred from the included study designs. It is important to note that point

of purchase promotions are likely to extend their influence to the young drinking population and to under-age drinkers.

Evidence statement 7: There is moderate but consistent evidence to suggest that point of purchase promotions are likely to affect the overall consumption of under age drinkers, binge drinkers and regular drinkers.

2.3.2 Billboard & Print Media

Typically advertisements in the form of billboards and magazines promote beer or spirits rather than wine (Garfield et al, 2003). However there is also a distinct target audience for advertisements for wine among young adults. Frequently billboards present party scenes (Mastro & Atkin, 2002) promoting the social desirability of alcohol-supported recreation. Increasingly in recent years these advertisements feature ready-to-drink products. Alcohol companies place significant amounts of advertising where youth are more likely per capita to be exposed to it than adults (Jernigan et al. 2005). A study of young people in Ireland (Dring & Hope 2001) found billboards were the second most common vehicle for alcohol advertisements after TV. Fleming et al (2004) found that awareness of advertising via billboards amongst an under age population was as high as 60%.

This section considers use of billboards and print media such as newspapers and magazines. In the UK poster and magazine advertising of alcohol-related products are regulated by the Advertising Standards Authority (ASA). A narrative synthesis is preferred here because each of these methods of advertising is fundamentally different and contributes to its own specific evidence base. No systematic reviews were found. This review therefore comprises individual studies that cover such media as billboards, magazines and newspapers

Details of studies
10 studies met the inclusion criteria. Most of these examined either magazines or billboards. All studies were published in English, with the earliest being published in 1997. Most studies were conducted in the USA. Several studies examined specific at risk groups of interest specifically underage drinkers and binge drinkers.

Outcomes
Studies typically measured exposure to advertising materials and its association with awareness, drinking intention or drinking behaviour. Most studies were cross-sectional although occasional studies used a longitudinal design.

Results
Several studies report a link between the appeal of printed advertisements and subsequent likelihood of consumption. Some studies simply audit exposure to advertising in magazines. Dring & Hope (2001) measured awareness of billboard advertising through self competed questionnaire and found that for young people ‘selling aspects of alcohol advertisements relate to linking alcohol to positive images of desirable lifestyles and little to do with selling the actual alcohol product advertised. There is some evidence that exposure to advertising extends beyond their explicitly intended audience to younger, under age children. The primary effect for these appears to be on the initiation of drinking. Once drinking has been initiated, exposure to advertisements raises brand awareness and several studies also indicate an effect on the volume and frequency of drinking.

Ellickson et al (2005) conducted a longitudinal study which examined exposure to magazines with alcohol advertisements amongst 7th grade drinkers and found this was predictive of frequency of drinking two years later.

Of particular concern has been the proximity of billboards to schools. Mastro & Atkin (2002) examined this issue through a content analysis. They found, however, that the images presented were not particularly salient to their study population of Mexican American High school students. This issue needs to be investigated in a UK context. There is some evidence from the same study that students are not able to distinguish between images promoted through billboards from magazines and other advertising media suggesting that a cumulative

effect arises from the multiple channels of advertising. Clearly this is important as restrictions on one form of advertising have frequently been reported to result in a transference of effort and advertising expenditure to other channels. Restricting advertising on billboards only, for example, is unlikely to have a significant effect on consumption especially given the relatively small overall effects of advertising in general (see above).

Limitations
Many of these studies use opportunistic USA student populations and are not generalisable to the typical population of UK young people. In addition many are cross-sectional and rely on self-report data making it difficult to establish whether anticipated behaviour as expressed through intention actually translates to actual behaviour. It is doubtful whether large surveys conducted by the Center of Alcohol Marketing in Youth (U.S) on Hispanic and African American youths have relevance to a UK population.

Summary
Studies are primarily surveys and cross-sectional studies so cannot be used to establish causality. Nevertheless there is a consistent picture from findings for various print-based media of an association between increased awareness and increased consumption. Through high exposure to recurring positive messages about alcohol over time young people have their attitudes or beliefs shaped or reinforced. This, in turn, can influence their intention and subsequent drinking pattern. It is important to consider this evidence as part of a general "marketing mix". Snyder et al (2006), for example, examined the effects of billboards within the context of an index of exposure covering four media (TV, radio, billboards and magazines) and). However, such an approach means it is not possible to disentangle the effects of individual communication channels and must be complemented by media-specific investigations.

Evidence statement 8: There is consistent evidence to suggest that exposure to outdoor advertising, or advertisements in magazines and newspapers may increase the likelihood of young people starting to drink, the amount they drink, and the amount they drink on any one occasion. Further research is required on whether what young people say they are going to do at a particular point in time translates into actual subsequent behaviour.

2.3.3 Alcohol related merchandising

Four USA-based studies were identified that examined the use of alcohol related merchandising. All of these studies consider the impact of alcohol related merchandising in relation to alcohol awareness or participation. Fisher et al (2007) found that possession of or willingness to use alcohol promotional items was associated with an increased likelihood of alcohol initiation, significantly so for girls. Furthermore they observed that among girls, possession of or willingness to use alcohol promotional items was associated with binge drinking. Among those precontemplating drinking these items had a greater effect than advertising. Similarly Hurtz et al (2007) found that one in five students in surveyed California middle schools owned at least one alcohol promotional item. Ownership of such items was again associated with being 3 times more likely to have tried drinking and 1.5 times more likely to report current drinking than students without such items. Two studies by Workman (2003 and 2004) examined the effects of such items in underage and binge drinking subsamples. While resisting causal inferences the studies did find high prevalence of ownership of promotional items relating to alcohol and located such items within an "already saturated" culture of pro-drinking.

Evidence statement 9: There is consistent evidence from cross-sectional studies that there are high levels of ownership of alcohol related merchandise among young people, particularly underage drinkers and binge drinkers. There is some evidence, although not conclusive, to suggest that ownership of such items is associated with initiation or current drinking.

2.3.4 Broadcast media

This category includes TV, films, radio, music and music video as well as the Internet. A narrative synthesis is preferred here because of the heterogeneity of these methods. No systematic reviews of use of broadcast media were identified.

TV is by far the most studied channel for alcohol advertising with studies analysing content or frequency of commercials, awareness by young people and association with drinking initiation of levels or frequency of drinking. The principal longitudinal studies have been identified from the review by Smith & Foxhurst, 2007 and are discussed below..

Details of studies
31 studies met the inclusion criteria. All studies were published in English, with the earliest being published in 1988. 21 studies were conducted in the USA, 5 in the UK, 3 in New Zealand and 1 in Belgium and 1 in Canada. Ten studies employed longitudinal designs with one being a prospective cohort study. Two econometric studies examined total advertising spend. There was one qualitative study. The majority of studies targeted under age drinkers. Two studies specifically targeted binge drinkers as the population of interest.

Outcomes
As with the preceding print media category studies typically measured exposure to advertising materials and its association with awareness, drinking intention or drinking behaviour. Most studies were cross-sectional although occasional studies used a longitudinal design.

Results
In the longitudinal study by Robinson et al. (1998) the research team investigated the association between hours of TV, music video and videotape viewing, computer and video game use and subsequent alcohol use at follow-up, The population was 14 to 15 year olds from six public high schools in California. At 18 month follow-up, 36.2% baseline non-drinkers began drinking and 50.7% drinkers continued to drink. In baseline non-drinkers onset of drinking was significantly associated with hours of TV viewing at baseline. Each additional hour of TV viewing per day increased the risk of starting to drink during the next 18 months by 9% (95% CI: 1% to 18%). For each additional hour of music video viewing average increased risk was 31% (95% CI: 17% to 47%). Computer and video game use was not associated with initiation of drinking. In baseline drinkers there were no significant associations between baseline media use and *maintenance* of drinking

In a further longitudinal study Van Den Bulck (2005) examined the relationship between TV viewing and music video exposure and subsequent alcohol consumption one year later in first and fourth year secondary school students in Belgium. 63.6% watched music videos at least several times a week, about a third watched daily. Overall TV viewing and music video viewing at baseline significantly predicted the amount of alcoholic beverages adolescents consumed one year later while going out.

Limitations
As with the category billboard and other print media studies are primarily cross-sectional and are therefore limited with respect to establishing causality. Two longitudinal studies, by Robinson et al (1998) and Van Den Buick (2005) were identified. However longitudinal studies do have acknowledged limitations in connection with the existence of possible confounders. In this case, for example, it is difficult to isolate the effects of broadcast media from other significant communication channels such as billboards, newspapers and magazines and from the effects of ownership of alcohol-related merchandise. Several studies are limited in examining the effects of home-viewing of videos rather than new technologies such as DVDs.

Evidence statement 10: There is consistent evidence from longitudinal studies that exposure to TV and other broadcast media is associated with inception of and levels of drinking. Evidence for the effect of watching videos is equivocal.

2.4 Advertising bans and other restrictions

There is increasing interest in the impact of a complete ban on alcohol advertising (TV, radio and billboards). All of the included studies consider the impact of advertising bans/restrictions in various forms. These could be bans relating to particular media, to particular populations or total bans on alcohol-associated advertising. A narrative synthesis is preferred here because of the heterogeneity of studies in this sample. This review comprises ten individual studies that cover advertising bans ranging from partial to total bans.

Details of studies

10 studies met the inclusion criteria. All studies were published in English, with the earliest being published in 1991. With one exception, all studies were conducted in the USA. Nevertheless, some of these studies constitute international comparative studies using cross-national level data. Studies represent either econometric studies projecting the effect of a ban or natural experiments where the effect in a particular country or region has been evaluated. No studies specifically examined the differential effect of bans on different types of drinkers. However, the study by Saffer & Dave (2003) did identify a price-binge participation elasticity.

Policy measures

Studies describe a range of levels of ban ranging from partial to complete. The analysis by Saffer and Dave (2002) analyses the correlation between per capita consumption in litres with the number of advertising bans enacted in each country. This has been criticised as a crude measure of ban enactment.

Outcomes

Most of the studies measure total consumption of alcohol. One study measures intention to consume.

Results

As previously noted the meta-analysis by Gallet (2007) suggests that, since the median advertising elasticity estimate is quite small, there is support for studies that have found that advertising bans have little impact on demand. It is likely that advertising bans in themselves will likely have only modest effects and will need to be augmented by additional methods such as taxation and price increases. This finding is supported in a UK context by a study by Godfrey (1994) that suggested that a 1 percent decrease in alcohol advertising would be associated with a 0.1 percent decrease in consumption. Nevertheless, with considerable amounts of alcohol-related advertising expenditure currently taking place in the UK large decreases could potentially have a disproportionate impact on hazardous drinking and related harms.

The study by Saffer & Dave (2003) identified an elasticity of advertising with respect to binge participation of about 0.14, showing that alcohol advertising has a positive effect on binge participation. Based on this data they estimate that complete elimination of alcohol advertising could reduce adolescent monthly alcohol participation by about 24 percent and binge participation by about 42 percent. For binge participation, the effect of complete elimination of advertising would be equivalent to about an 80 percent increase in price. An earlier study by Saffer (1991) found that countries with complete bans on TV alcohol advertisements had 11% lower consumption rates and 23% lower motor vehicle fatalities rates than did countries with partial restrictions.

Proponents of the case that bans of advertising will not reduce consumption consistently argue that advertising merely competes for market share. In harmony with this hypothesis, Fisher & Cook (1995) found, by analysing U.S data from 1970 through 1990, that although years with higher total wine and spirits advertising had higher relative levels of consumption, a model accounting for changes over time found no evidence that changes in advertising were related to changes in consumption. Results did however indicate that increased advertising of spirits was linked to a drop in the market share for wine, suggesting that such advertising may realign market share.

Limitations

It should be noted that the effectiveness of a particular intervention involving a form of ban will

be determined by a number of other factors. These include the existing effectiveness of a particular channel of communication which may vary across cultures, settings and populations, the degree of enforcement and the facility for advertisers to redirect their resources to other channels that might thus escape the effect of a ban e.g. product placement or event sponsorship. In support of this, Seldon et al (2000) found that beer producers would be able to substitute fairly easily with print advertising should a TV or radio ban be enforced again suggesting that a partial ban is unlikely to succeed.

Similarities with findings for taxation are also relevant in that an advertising ban (as with high rates of alcohol taxation) may be reflective of a general climate of alcohol intolerance. It is difficult to extract the specific effect of an advertising ban from these other variables. Chisholm et al (2004) model the effects of such a ban in terms of a between 2% and 4% reduction in the incidence of hazardous alcohol use. They conclude, as previously mentioned in Review 1, that in a "wet" population with a higher prevalence of heavy drinkers (i.e. more than 5% as is the case in Britain) the most effective and cost-effective intervention was taxation, whereas in "dry" populations with a lower prevalence advertising bans are more effective than taxation.

Summary
Studies examining the effects of alcohol advertising on consumption do not support or counter a hypothesis for a causal relationship. This is mainly attributable to the considerable variation in the use of advertising bans across countries and methodological challenges. It should also be recognised that imposition of a ban may require an extended period of time, within which to affect consumption and even longer to have an effect on harms.

Evidence statement 11: There is some inconclusive evidence that suggests that advertising bans have a positive effect in reducing consumption. Differences in contextual factors are a likely explanation for these differences. It is methodologically challenging to control for all possible confounding factors.

Evidence statement 12: There is some evidence to suggest that bans have an additive effect when accompanied by other measures within a general environment of restrictive measures.

2.4.1 Industry self-regulation of alcohol advertising standards

This review was unable to find any studies that evaluate the effect of industry self-regulation as a policy measure to restrict advertising content. Given the topic area this finding is not in itself surprising. A review by Anderson, published as recently as 2007, concluded within the specific context of alcohol advertising that: "There is no scientific evidence available that tests the effectiveness of non-statutory regulation or shows that it works in regulating the content of commercial communications or in reducing the volume of commercial communications".

Regulation of advertising content has three components: legislation (defining appropriate rules); enforcement (initiating actions against violators); and adjudication (deciding whether a violation has taken place and imposing an appropriate sanction) (Swire 1997). In the United Kingdom, the variant currently applied is 'co-regulation' where rules are developed, administered and enforced by a combination of government agencies and industry bodies (Caswell and Maxwell 2005). Thus broadcast advertising is co-regulated by Ofcom, the statutory body overseeing content and structure of the communications sector with responsibility for auditing, and the Advertising Standards Authority, acting as a ''one-stop shop'' for advertising standards and consumer complaints.

Self-regulatory codes of conduct have been developed in some economically developed countries whereby the acceptable and unacceptable content of advertisements is defined and self-monitoring, or some kind of combined industry and government monitoring, is used to examine complaints. Some difficulties highlighted in Australian studies where such a system operates include ample evidence of multiple violations as rated by ordinary members of the public (Saunders 1993) and by experts in marketing (Jones and Sullivan, 2002) - even in

advertisements where complaints were overruled. A formal review of self-regulatory process found significant weaknesses and noted that consequences for breaches were insignificant and often were only applied after a series of adverts had been running for several weeks (National Committee for the Review of Alcohol Advertising, 2003). This Section is not a major focus for this review as the investigators and commissioners are aware of a forthcoming report by government-commissioned report (by KPMG) which handles these issues in more detail.

Several advantages are claimed for self regulation in preference to government regulation. These include increased flexibility and efficiency and, more significantly, that it reduces costs by shifting the cost of developing and enforcing rules to industry and provides greater incentives for compliance (Swire, 1997).

2.5 Counter advertising and public service announcements

Most of these studies consider counter advertising which involves “disseminating information about a product, its effects, or the industry that promotes it, in order to decrease its appeal and use”. The distinction from other types of informational campaigns lies in that it directly addresses the fact that the particular commodity is promoted through advertising (Stewart 1997). Other studies examine public service announcements (PSAs) which are “messages prepared by nongovernmental organizations, health agencies or by media organizations for the purposes of providing important information for the benefit of a particular audience” (Anderson, 2007). PSAs depend upon donated time or space for distribution to the public, typically involving messages that deal with “responsible drinking,” the hazards of driving under the influence of alcohol, and related topics. Despite their good intentions, PSAs are considered an ineffective antidote to the high-quality pro-drinking messages that appear much more frequently as paid advertisements in the mass media. In many cases the messages in PSAs are tailored to be particularly relevant to drinking by youth (Connolly et al. 1994; Holder 1994). In a traditional review, Gorman (1995) identified the limited impact of PSAs, and mass media interventions that use a universal strategy on alcohol use and alcohol-related problems. However in a Canadian study that falls outside the time coverage of this review Casiro et al (1994) found that after a TV campaign on the dangers of alcohol consumption during pregnancy, more women concluded that drinking would put their baby at risk, and attributed this information to TV.

The review identified 7 studies in the area of counter-advertising. All of the studies were carried out in the USA, with the exception of 1, which was a USA/Australia comparative study. A variety of research designs was used, including content analysis, experimental studies, a controlled trial, and a lab test. Student samples were used in 3 of the studies, and high school pupils were also used in 3; the final study used a mixed sample of both students and high-school pupils. As far as target groups were concerned, 1 study dealt with binge drinkers, and 4 included under-age drinkers in the sample. Taken together, the studies generally investigated respondent exposure to, reception of, attitude to, and opinion about counter-advertising in the context of their beliefs, attitudes and behaviour in relation to alcohol and of their media usage. Media used in these studies to carry warnings about alcohol included a simulated promotional t-shirt, a fictitious beer brand bottle label, and television, video and magazine advertising. Generally speaking, there is some evidence to suggest, for example, that the power of counter-advertising on television to affect teenage decision-making concerning alcohol depends on production quality, tight targeting, perceived relevance, realism, similarity, desirability, and identification, as well as on positive messaging; the strength of the counter-advertising statement, and its prominence are also factors; counter-advertising is not seen to be as effective as commercial advertising; commercially sponsored warnings may not have an adverse effect on the perception of the alcohol provider; warning messages which mention less salient risks might promote greater societal welfare than messages currently on packaging. Generally speaking, there is a need for further research. Such research would need to examine the impact and effectiveness of different kinds of pro-social advertising and warnings across the full range of promotional media. It would also need to develop research designs which would take account of how such messages are consumed and interpreted by the specific target groups as they naturally occur within the UK context.

These studies consider the use of mass media marketing to reinforce community awareness of problems created by alcohol use. This approach may be used to prepare the ground for specific interventions (Casswell et al. 1990; Holder and Treno 1997). According to Anderson & Baumberg's (2006) report *Alcohol in Europe,* media advocacy is also used to support a shift in public opinion for policy changes for example of the introduction of standard drinks labelling on all Australian alcohol containers (Stockwell and Single 1997).

A narrative synthesis is employed for this section because of the heterogeneity of studies in this sample. No systematic reviews of counter-advertising interventions or of PSAs were identified. This review therefore comprises individual studies that cover media advocacy-related interventions such as education and public information approaches targeting the behaviour of the individual drinker or mobilising public support for prevention measures (Casswell and Gilmore 1989). It also includes counter-advertising related interventions such as health warning labels on product packaging and media literacy efforts to raise public awareness of the advertising tactics of the alcohol industry, as well as prevention messages in magazines and on TV. Examples of counter-advertising cited by *Alcohol in Europe* involve inclusion in community or school prevention programs (e.g., Giesbrecht et al. 1990; Greenfield and Zimmerman 1993), or as part of the multiple agenda of government spirits board retail systems (Goodstadt and Flynn 1993).

Evidence to date signals a need to manage the balance between public health campaigns and industry advertising in an active and circumspect manner. This includes considering the extent to which industry should take an explicit responsibility for supporting public health messages, It would, for example, be perverse if the industry was to contribute to the content of counter-advertising and yet, at the same time specifically undermine its messages through its own advertising strategies.

2.6 Implications for particular policy priority groups

Details of specific policy priority groups included in research studies can be identified from the following evidence tables, which indicate in the first column of the tables if the study covers one of the priority groups.

Underage drinkers

Studies of the effects of advertising on young person's drinking have been criticized (Thomsen & Rekve 2004) for not being able to provide sufficient empirical support for a causal link between media exposure and attitudes and behaviours (e.g. mentioning Kohn and Smart 1984; Smart 1988). Others are limited as evidence in only being able to report very small effect sizes (Nelson 1999; Strickland 1983). A study predating the review, Aitken et al (1988) did find that TV advertisements in particular have an effect in encouraging underage drinking.

Binge drinkers aged 18-24

Kuo et al (2003) examined the relationship between local alcohol marketing rates (number of bars and liquour stores located near campus) and promotions (like "all you can drink" for one price) and college binge drinking rates. Promotions such as special prices at certain times and sales of high volume containers (kegs and "party balls") were strongly linked with increased heavy drinking. Some commentators have identified methodological problems with this study.

Interestingly, this study also found that binge-drinking rates were elevated when college students were more likely to be "carded" or "proofed" to verify their ages to drink at bars. While the researchers thought this might be explained by greater enforcement efforts in areas with bigger problems, it could support the argument of those who believe that a higher drinking age is likely to increase bingeing. In this scenario, under-age drinkers, fearful of being caught, buy alcohol in larger quantities when they can get it and drink it faster so they

can hide the evidence. Saffer & Dave (2003) identified a modest positive effect of alcohol advertising on binge participation.

Low income

No studies were identified from the advertising research literature specifically examining this particular priority group.

Harmful drinkers

No studies were identified from the advertising research literature specifically examining this particular priority group.

2.7 Conclusion

Advertising and promotions in general

Available evidence suggests that price promotions do increase binge drinking and that exposure to point of purchase advertising predicts the onset of youth drinking. Regardless of their explicit intention there is evidence for an effect of alcohol advertisements on underage drinkers. Consistent with this, evidence suggests that exposure to such interventions as **TV**, **music videos** and **billboards**, which contain alcohol advertisements, predicts onset of youth drinking and increased drinking. As a consequence one may conclude that restricting the volume of advertisements and merchandising is likely to reduce consumption and subsequent harm.

Multiple methods and media are currently used to promote alcohol products to different segments of the population in economically developed countries like the UK. Although a number of studies exist about individual types of advertising, the data on which such evidence is based is often less than adequate. Some countries have attempted to ban or restrict some or all categories of alcohol promotion and there is a literature concerning evaluations of the impacts of such bans on both consumption of alcohol and, in some cases, on adverse outcomes such as alcohol-related road trauma.

Evaluating the relationship between expenditure on advertising, restrictions on advertising and alcohol consumption can be complex. Expenditure on alcohol advertising across different media will rise and fall as rival companies perceive an opportunity to exploit a new market or add to their market share. It is extremely difficult in such a situation to measure and model the effects of advertising on alcohol consumption, not least in particular subpopulations. Nonetheless, attempts have been made with mixed results to model these effects.

The link between advertising and consumption is clearest in terms of evidence when read longitudinally. It is also consonant with “social marketing” work on tobacco and food policy/impact, which is having an increasing effect on policy-making. This effect is also attested to by some larger independent surveys with a lower potential for bias.

Against such evidence is ranged a significant body of scholars who attempt to argue that advertising does not increase demand. The affiliation and interests of this group are worthy of closer inspection with evidence of exposure through a somewhat limited range of publishing vehicles. Such opponents of the view that advertising stimulates consumption and has the ability to create growth in alcohol markets persist with the claim that advertising is only about brand switching. Given that providers are continuously seeking to stimulate growth in earnings per share, it is difficult to see how this claim is tenable. Advertising is a key component of marketing strategy to deliver such growth as evidenced by high adspend/turnover ratios.

However, based on the evidence, it is difficult to consider that measures to control the use of specific advertising channels, rather than comprehensive bans, will have a significant impact when compared with other policy options. It is true that advertising may have an aggregative effect but when relatively modest individual effects are taken into account it is clear that

attempts to restrict these may not suffice when they are the mainstay for any policy interventions.

In terms of priority groups, it is well documented that in economically developed countries like the UK, adolescents and young adults receive considerable exposure to alcohol advertising and promotions of different kinds. Studies have explored and measured the extent of alcohol advertising in student newspapers, TV programmes, popular music, point-of-sale promotions, movies approved for young people aged 14 years and over, at sporting events, at concerts, in magazines and placement of alcohol brand names on items owned by young people (Anderson & Baumberg 2006). The use of advertising that highlights low prices is particularly common (Pedersen (2002). One USA study (Jernigan et al, 2004) found that underage youths (ie under 21 years) were substantially more likely to be exposed to alcohol adverts than were those aged 21 years or older suggesting specific targeting by the alcohol industry of underage drinkers. This effect was especially pronounced for females. Furnham et al. (1997) reported that 86% of all episodes of British TV soap operas contained visual or verbal references to alcoholic beverages. There are also studies demonstrating a) heavier drinking young people are more likely to see and appreciate alcohol promotions and b) young people who are more exposed to alcohol advertisements and like them are more likely to be heavy drinkers later in their development (Collins et al, 2007) and/or express greater intension to drink (Pasch et al, 2007). These studies are suggestive of a causal link between advertising and an increase in consumption of young people but do not, on their own, constitute definitive proof.

Specific types of promotions

Several studies have explored more micro- or local-level forms of alcohol promotion such as happy hours or "never-ending" refillable glasses. Price discounting is associated with increased binge drinking (Kuo et al, 2005) but the relationship is complicated by seasonal changes in consumption, such that as demand increases at a particular time of year, competition for customers means that the opportunity to discount prices may be greater as retailers compete to maximise their market share. However, a classic experimental study lends weight to Kuo et al's findings by demonstrating that half price drinks during happy hours increased overall consumption of both occasional and regular drinkers (Babor et al, 1978).

Bans and other restrictions

Studies of complete bans of one or more forms of advertising across different jurisdictions or countries provide clearer opportunities to estimate the effect sizes. However, even these studies can be subject to the confounding effect of the "wetness" or "dryness" of local drinking cultures. For example, advertising bans may be more likely to be implemented in countries after alcohol consumption and related problems have been rising for some years. In other countries, a predominantly "dry" sentiment might encourage both low levels of drinking and high levels of restriction. Arguably, the best studies examine the impact of changes over time in advertising restrictions on local levels of alcohol consumption.

One high-quality meta-analysis covering 132 studies (Gallet, 2007) from a variety of countries, time periods and using different methodologies estimated specific elasticities for changes in advertising expenditure on the expenditure on specific beverages. This analysis showed only very small effects, but the use of aggregate total advertising expenditure to estimate the effects of advertising has been widely criticised.

Studies of the impact of advertising bans or partial restrictions have produced varying estimates of the effect sizes. An earlier systematic review and modelling of the impacts of alcohol policies on alcohol consumption (Chisholm et al, 2004) estimated modest effects of only between 2% and 4% decrease in consumption of alcohol from a complete ban. One USA-based research group found no evidence for advertising bans affecting consumption in analyses of longitudinal data from 45 USA states between 1983 and 1997 (Nelson et al, 2004) and longitudinal data on 17 OECD countries (Nelson and Young, 2001). Another USA-based research group found consistently positive results suggesting the effectiveness of advertising bans on *youth* drinking when studying longitudinal USA survey data (Saffer and Dave, 2003; Saffer and Dave, 2006) as well as economic data from 20 OECD countries

(Saffer and Dave, 2002). Both sets of studies found evidence suggesting advertising bans negatively affect alcohol consumption. Other published analyses of the impacts of advertising bans suggest there are multiple ways of getting around these, as well as the possibility of other unintended consequences such as increased price competition as a means of increasing market share (Tremblay & Okuyama, 2001).

Industry Self Regulation

To date, self-regulation by beverage alcohol industry does not have a good track record for being effective. There is a forthcoming UK report by KPMG, which will describe a detailed investigation of this issue.

Counter advertising and public service announcements

A few studies have explored the potential impact of "counter advertising" which uses various opportunities to provide health and safety messages supposedly to combat the effectiveness of alcohol promotions. The literature suggests that the volume of these in most countries is tiny compared to that of alcohol advertisements, that they are not perceived as effective by consumers nor is there substantive empirical evidence to suggest effectiveness (Gorman, 1995).

Summary

In summary, in saturated alcohol markets such as that in the United Kingdom, drinkers and potential drinkers are exposed to a plethora of alcohol promotions. Young people, and young women in particular, are very likely to be exposed to these, aware of them and there is suggestive evidence that their attitudes towards alcohol and inclinations to drink can be shaped by this exposure. There is increasing evidence that alcohol advertising seen by young people is associated with initiation of drinking and with heavy drinking. Much of the evidence comes in the form of cohort studies from USA, New Zealand and otherwise outside of the UK. However, there is sufficient consistency of effect across a wide range of advertising media to suggest the need for preventative measures. This is particularly the case as those affected by advertising include youths and young people on either side of the regulatory age limits.

There is conflicting evidence as to whether banning alcohol advertising will have significant effects on consumption with some studies suggesting no effects or even positive effects on consumption while others have suggested quite significant reductions in both consumption and related harms. However, there are significant methodological difficulties with conducting these studies. We conclude that a modest effect of alcohol advertising and promotion on alcohol consumption is probable. This is consistent with marketing research concerning other products. Elasticities in the range of 0.02 to 0.04 (Chisholm et al, 2004) and 0.05 and 0.08 (Saffer and Dave, 2003) for the effects of advertising bans are plausible.

There is no evidence to support the effectiveness of self-regulatory codes either as a means of limiting types of advertisements deemed unacceptable or as a means of reducing alcohol consumption.

Evidence of various types supports that local price discounting is highly effective, a conclusion consistent with the large number of studies reviewed in Review 1.

2.8 Evidence Tables: Review 2

Table 7 Effect of advertising on consumption

Authors	Design/Type of study	Sample, Outcome Measure, Analysis	Effects on consumption	Limitations, comments and conclusions
Smith & Foxcrofft (2007) UK	Systematic review Studies identified by searches of electronic databases supplemented with hand searches of reference lists of retrieved articles (October 2006).	**Study Sample** Seven cohort studies following up more than 13,000 young people aged 10 to 26 years old **Outcome Measures** Exposure to advertising or marketing and drinking at baseline and assessed drinking behaviour at follow-up in young people **Data analysis** Number of observations and median elasticity	Studies evaluated range of different alcohol advertisement and marketing exposures including print and broadcast media. Two studies measured hours of TV and music video viewing. Studies measured drinking behaviour using variety of outcome measures. Two studies evaluated drinkers and non-drinkers separately. Baseline nondrinkers more likely to have become a drinker at follow-up with greater exposure to alcohol advertisements. Little difference in drinking frequency at follow-up in baseline drinkers. In studies of mixed populations of drinkers and non-drinkers, increased exposure at baseline lead to increased risk of drinking at follow-up. Two studies demonstrated a dose response relationship.	**Limitations** • Threat to validity of cohort studies is confounding, whereby outcome is modified by other factors in addition to exposure of interest. • Although all studies controlled for some confounding factors, unmeasured or unknown confounders cannot be adjusted for. It is not possible to know if residual confounding influenced analysis. • Magnitude of effect sizes suggests they may be due to residual and unmeasured confounding. **Reported conclusions (by authors).** • All seven studies demonstrated significant effects across range of exposures and outcomes (Direct advertising (broadcast and print media) and indirect methods (in-store promotions and portrayal of alcohol drinking in films, music videos and TV programmes)). • Further research exploring potential causal impact is warranted.

Gallet (2007) USA	Meta-analysis	**Study Sample** 132 studies reporting alcohol elasticities (1945-2003). 322 observations relate specifically to advertising. **Outcome Measures** Price elasticities **Data analysis** Number of observations and median elasticity	Number of observations (median advertising elasticity) Beer 95 (-0.020) Wine 83 (-0.007) Spirits 81 (-0.070) Alcohol 63 (-0.032) Adult 0 Young Adult 0 Teen 0	**Limitations** • Differences exist in specification of alcohol demand across literatures with median elasticities being larger for more recent methods. **Reported conclusions (by authors).** • Since median advertising elasticity estimate is quite small suggests advertising bans have little impact on demand. • Spirits and alcohol (overall) most responsive to advertising. • Advertising elasticity is larger for spirits than all other beverages. • Since demand for spirits is most responsive to advertising limits on advertising will be most effective if directed towards media most often used by distillers.

Table 8 Studies linking price/sales promotion and consumption

Authors Country	Study Design	Sample and Interventions	Methods	Consumption Outcomes Other Outcomes	Limitations and Conclusions
Bray, Loomis and Engelen, 2007 USA		64 retail markets in United States	Used InfoScan Retail Tracking scanner data. Scanner data are collected from supermarkets and reported for each calendar quarter from 1995-1999. **Analysis** Estimated brand- and packaging-specific own- and cross-price elasticities for beer.	Brand- and packaging-specific beer sales are highly price elastic. Cross-price elasticity estimates suggest individuals are more likely to buy a higher-volume package of the same brand of beer than to switch brands. Policy simulations suggest regulation of volume-based price discounts is potentially more effective than tax increase at reducing beer consumption.	**Limitations** Results may not generalize to other retail channels such as small grocery stores, liquor stores, and convenience stores. However, supermarkets capture almost as much of market (40%) as convenience stores (23%) and liquor stores (21%) combined. Conclusions strictly apply only to consumers who purchase beer in supermarkets, but large market share of supermarkets in beer sales suggests results may have broader applicability. Analysis did not consider possible substitution between beer and other alcoholic beverages, such as malt liquor, wine, or spirits. Although the substitution between beer and other alcoholic beverages is an important conceptual issue, previous research suggests that it is not a major empirical one. Based on results it appears beer drinkers most likely switch package size when faced with a price change. Prices/promotions are potentially endogenous so price effects do not only reflect a shift in supply curve, but also capture movement along supply curve. Therefore price elasticities are underestimates. **Reported conclusions (by authors).** Volume-based price discounting induces people to buy larger-volume packages of beer and may lead to increased overall beer consumption. Decrease of 10% in average price of a 6-pack would slightly decrease total beer sales because more sales are taken away from 12-packs and 24-packs than are replaced by increased sales of 6-packs. A 10% decrease in 12-pack and 24-pack prices would increase total beer sales, with decrease in 12-pack prices having much larger effect.

Christie, J., Fisher, D., Kozup, J. C., Smith, S., Burton, S. and Creyer, E.H. (2001). USA 2 studies so refer to as study 1 and study 2 aim of both provided in comments. Binge Drinkers	Two between-subjects experiments	**Setting** **Study 1** – Major Southern University **Study 2 -** Major Southern University **Baseline sample** **Study 1** – 189 subjects Mean age 21.4 years. 87 binge drinkers 102 non-binge drinkers **Study 2** 194 students limited down to 164 who had consumed alcohol in the past year. Mean age 23 yeas. 59% categorised as binge drinkers.	**Study 1** 189 undergraduate students who reported having consumed alcohol in the last 6 months. **Study 2** 164 undergraduate students who had consumed alcohol in past year. **Outcome measures** **Study 1** – self-report of alcohol consumption Measures of attitude towards ad shown, towards the bar, bar patronage intentions and alcohol consumption-related expectancies. Absolute estimates of number of beers or glasses of wine they would expect to be consumed by self, female college student, male college student, female nonstudent & male nonstudent. **Study 2** Attitude towards ad and bar Bar patronage intentions Perceptions of management concern about its customers Consumption expectations Perceived risk related to driving associated with alcohol consumption. **Data analysis** **Study 1** – used a between-subjects multi-variate analysis of variance (MANOVA) with follow-up univariate tests. **Study 2 -** used a between-subjects multi-variate analysis of variance (MANOVA) with follow-up univariate	**Study 1** Advertised promotions positively affect attitudes ($p<.05$) and intentions of patronizing bar ($p<.01$) and influence students' expectations of amounts consumed for themselves and other consumers ($p<.01$). More favourable attitudes & intentions found for promotions with reduced drink prices than for promotion with reduced prices on appetizers. Compared with non-binge drinkers binge drinkers believe that the promotion is likely to increase their consumption of alcohol ($p<.01$) **Study 2** When a social responsibility message about not drinking and driving is included in advertisement, bar patronage intentions are lower for non-binge drinkers, but no effect of the message for binge drinkers. Inclusion of the personal responsibility message has no effect on intentions for binge drinkers ($p > .10$), but inclusion of the message leads to lower patronage intentions for non-binge drinkers ($p < .05$). Binge drinkers in general perceive less risk of driving after drinking and much less risk at intermediate consumption level of 3 to 4 drinks.	**Limitations** • For both studies mean age of respondents was provided but no range. • Consumption levels are based on self-report. • Small sample size. • Study only included students who had drunk alcohol in last 6 months. There was no non-drinker group with which to compare results. • Studies depended on participants volunteering to participate, which may impact on results. • For both studies number of binge and non-binge drinkers was different which impact on results. • Examined effects on attitudes, patronage intentions, and consumption estimates rather than actual behavioural measures. • Another limitation is forced exposure to advertising stimuli. • Convenience sample makes it difficult to generalise results to university investigated or other universities. **Comments** • Study 1 examines how different types of alcohol beverage promotions affect binge & non-binge drinkers' attitudes, intentions, perceptions & expectancies. • Study 2 examines if messages that encourage responsible drinking behaviour have intended effect of discouraging binge drinking or if they serve as an additional enticement for frequent users of alcohol? • Binge drinking is defined as 5 or more drinks in a single time period for a man and 4 or more for a woman in some studies and as 5 or more regardless of sex in others. • For study 1 an initial pilot test was conducted to help determine appropriate levels for manipulations. **Reported conclusions (by authors).** **Study 1** • Advertised discounts on alcoholic beverages influence consumers' attitudes, intentions, and alcohol consumption-related expectations for both themselves & others. • Compared with non-bingers, binge drinkers had higher patronage intentions & expected to consume more alcohol in response to promotion.

			tests.		• Average level of estimated consumption exceeds or approaches binge-drinking levels across all types of consumers. **Study 2** • When social responsibility message about not drinking and driving is included in advertisement, bar patronage intentions are lower for non-binge drinkers, but no effect for binge drinkers. • Binge drinker, group most likely to engage in risky behaviours, largely disregard message info. • Both studies suggest effects associated with use of different alcohol-related promotions often run by bars. • Relatively consistent findings for patronage intentions and consumption estimates across studies, coupled with strong effects for binge drinkers, suggest that some promotions warrant additional research. • In most cases, mean level of estimated consumption approaches or exceeds binge drinking levels across male and female student consumers & subjects' self-estimates. Data suggest that norms that underlie estimates for both non-binge & binge drinkers are higher than policymakers would desire.

Clapp, J. D., Shillington, A. M. & Heidt, L. (2000) **USA** **Binge Drinkers**.	Descriptive study (Survey)	**Study Setting:** Large urban university in southern California. Survey data collected 1998. **Sample at Baseline:** 403 randomly selected undergraduate students. 12% of students refused to participate, these were randomly replaced. Age: mean 24.0, SD 3.75, median 22. Gender: Male 44.2% Female 55.8% Race/Ethnicity: American Indian 0.5% African American 5% Hispanic 19% Asian/Pacific Islander 14.8% White 54.5% Other 6.3%	**Study Sample:** 403 undergraduate students. **Outcome Measures:** Alcohol promotion – Extent to which alcohol promoted on campus by the following entities: bars & nightclubs, grocery & liquor stores, bars & nightclubs in Mexico (located within 50 miles of the study campus) & alcohol beverage industry. Perceived extent of alcohol promotion on campus Alcohol consumption - Number of times respondents had consumed 5 or more drinks at single sitting during past 2 weeks (binge drinking), & 30 day alcohol use. **Data analysis:** Analysed students' perceptions of the extent alcohol is promoted on campus by their drinking patterns. Drinking patterns defined by constructing typology of alcohol consumption containing 4 categories: Abstainers, non-binge, occasional binge drinkers & frequent binge drinkers.		29.3% of students indicated that alcohol promotion occurred a "great deal" whereas 36.4% indicated that such promotional was "somewhat" prevalent. Nearly ½ of respondents perceived Bars & clubs as advertising on campus "somewhat" (27.6%) or a "great deal" (20%). Abstainers (mean 10.0, SD 2.5) and non-binge drinkers (mean 9.9, SD 2.6) perceived there was more alcohol promotion on campus than occasional binge drinkers (mean 8.6, SD 2.5) or frequent binge drinkers (mean 8.9, SD 2.5). Post hoc Scheffe tests revealed the following differences: Abstainers differed from occasional binge drinkers (mean difference = 1.4, p = 0.009). Non Binge drinkers differed from	**Limitations**: • No opportunity to determine reasons for differences between different drinking categories & perception of alcohol promotion. • Interview schedule not fully evaluated for validity. • Survey data collected in 1998 may not be representative of current students. • Focused on one university so results may not be generalisable to other universities or geographic locations. • Relied on self-report data. • Sample slightly over represents white students and under represents minority students. • Number of students in each drinking category differed which may have impacted on results. e.g. there were 131 abstainers & only 50 frequent binge drinkers meaning that results for former may be more representative than latter. • P values are between abstainers & occasional binge drinkers not abstainers & frequent binge drinkers. Mean difference between abstainers & frequent binge drinkers was only 1.1 and between non-binge drinkers & occasional binge drinkers only 1. • Unable to account for variance in Campus Promotion Index based on exposure to specific types of on-campus promotion. Further studies should monitor & examine exposure to different outlets for campus promotion. • Although sample adequately represents study population, it is older than typical college population. Given younger students are more likely than their older peers to be binge drinkers, age of study population must be considered. Replication with more typical college students would be worthwhile. **Comments:** Addresses the following: **1.** To what extent do college students perceive alcohol is promoted on campus? **2.** To what extent do different alcohol consumption patterns vary with perceptions of alcohol promotion on campus? • Interviews undertaken by phone as this may actually yield more valid than face-to-face when assessing sensitive topics. • Interview protocol was pilot tested. • Demographics of sample generally represented

					occasional binge drinkers (mean difference = 1.3, p = 0.023).	characteristics of study population apart from gender. **Reported conclusions (by authors):** • Students differed in perceptions of alcohol promotion based on drinking patterns. Abstainers & non-binge drinkers expressed perception that alcohol was promoted to a greater extent on campus than respondents classified within binge-drinking category. • Although, unable to assess disparity between actual alcohol promotion & perceptions of that promotion, perceptions of alcohol promotion are theoretically important enough to consider when modelling student alcohol consumption.

Collins, R. et al (2007) USA Underage	Longitudinal study Survey	**Study setting.** Elementary Schools in South Dakota, USA **Sample at baseline** 1959 grade 5 students from 39 schools. 91% completed additional survey at grades 6 and 7 (n=1786) Sample average of 11.8-year old at grade 6 (SD = 0.6). 51% female Ethnicity: 85% white, 12% native American 3% other race.	**Study Sample** 1786 South Dakota youths surveyed when grade 5's at baseline 2000 and in grade 6 and 7. Missing data resulted in analysis sample of 1699 youths for predicting drinking and 1740 for drinking intentions. **Outcome Measures** Exposure to TV beer ads, alcohol ads in magazines, in-store beer displays and beer concessions, radio listening time and ownership of beer promotional items during 6th grade. Past-year beer drinking measured at grade 7 Drinking intentions for coming 6 months at grade 7 **Data analysis** Multivariate regression equations predicted the two drinking outcomes using the advertising exposure variables and controlling for psychosocial factors and prior drinking.	15% at grade 5 & 17% at grade 6 reported that they had ever drunk a can or bottle of beer, 27% had by grade 7. 17% of youth reported past year beer drinking at grade 7. 16% "definitely" or "probably" would drink in the next 6 months; 23% "probably would not; 61% "definitely would not". Advertising exposure variables were all significant, positive predictors of grade 7 beer drinking and drinking intentions. TV sports beer ads, other TV beer ads, radio listening and ownership of promotional items were all significant predictors of drinking, all *p* values < .05. There were significant associations between drinking intentions and exposure to ads on programmes other than sport, exposure to magazines, and ownership of promotional items, all *p* values < .05. The joint effect of exposure to ads from all measured sources was significant *p*<.05.	**Limitations** • Boys more likely to be lost to follow-up thus results may not be truly representative. • Participants from South Dakota - ranks among the top ten states in binge drinking among adolescents. Results may not generalise to other locations. • Study relies on self-report measures. • Study did not conduct a comparative test of advertising effects on older adolescents so can't know if early adolescents is an especially vulnerable period but this is possible. **Comments** • Aimed to determine whether early adolescents who are exposed to alcohol marketing are subsequently more likely to drink. • Study included variety of controls for known predictors of underage drinking. • Studies younger age group than other studies. Present study tested for alcohol advertising effects on youths exposed during grade 6, the youngest sample that has been studied longitudinally. • Looked at wider variety of advertising than any previous study. Measures of TV, radio & magazine exposure tapped both high attention information processing and minimally-attentive processes by measuring likely exposures regardless of attention level or recall. • Uses measures of exposure validated in previous studies. • Tested effects on underage drinking and intentions to drink in the near future. As ads might produce intentions that study participants don't have chance to act on before follow-up survey. • Effects tested longitudinally to provide evidence regarding the possibility of a causal relationship. **Reported conclusions (by authors).** • Joint effect of exposure to advertising from all 6 sources at grade 6 was strongly predictive of grade 7 drinking and grade 7 intentions to drink. Youth in 75th percentile of marketing exposure had predicted probability of drinking 50% greater than that of youth in 25th percentile. • Although causal effects are uncertain, policy makers should consider limiting a variety of marketing practices that could contribute to drinking in early adolescence. Concerns have been directed at TV advertising, but other marketing may also pose risks.

Ellickson, P., Collins, R. L., Hambaesoomians, K. & McCaffrey, D.F. (2005) USA Underage	Longitudinal study, prospective design	**Setting** 41 middle schools in South Dakota, USA Middle schools participating in the ALERT (middle schools) and ALERT Plus (middle plus high schools) drug prevention curricula either as a treatment or control group. **Sample at baseline** n= 3780 students 484 failed to complete 1 of surveys & 184 excluded as had missing value for 1 of outcome variable.	**Sample** 3111 7th graders 50% female, 88% white, 6.3% Native American and 5.4% other race/ethnicity. Approx 1 in 5 reported grades of C or below at baseline. **Outcome measures** Students completed 3 surveys – Baseline drinking status obtained after students started grade 7 (fall 1997) from the grade 7 ALERT plus Survey. Adolescents classified as non-drinkers or drinkers. Drinking outcome data obtained spring 2000 through Grade 9 ALERT PLUS survey, student asked to indicate how often they had used alcohol in past year (none, 1 to 2 times, 3 to 10 times, 11-20 times, more than 20 times). Exposure to alcohol advertising measured through the grade 8 Media Survey Spring 1999 (source of information on exposure to alcohol advertising and TV viewing styles). **Data analysis** Regression models with multiple control variables examined the relationship between exposure	48% grade 7 non-drinkers qualified as past-year drinkers by spring of 9th grade indicating a substantial amount of initiation over period examined. Among baseline drinkers, 77% reported using alcohol in the past year at grade 9 follow-up. For 7th grade non-drinkers, exposure to in-store beer displays predicted drinking onset by 9th grade. For 7th grade drinkers, exposure to magazines with alcohol advertisements & to beer concession stands at sport or music events predicted frequency of grade 9 drinking. Although exposure to TV beer advertising had a significant bivariate relationship with alcohol use for grade 7 non-drinkers, it was not a significant predictor of drinking for either group in multivariate analysis. Participation in the prevention program, ALERT Plus, reduced further drinking for both groups & counteracted the effect of in-store beer displays. 90% of both groups reported seeing beer ads on TV, being exposed to in-store beer displays & seeing beer concession advertising at sports or concert events. However, somewhat fewer looked at magazines with alcohol ads (84% for non-drinkers, 81% for drinkers). Comparing mean exposure scores across the 2 groups shows than the baseline drinkers had significantly greater exposure than the non-drinkers to alcohol ads in magazines, in-store displays & at sports and music events.	**Limitations** • Of 3780 students 484 failed to complete 1 of surveys & 184 excluded as had missing value for 1 of outcome variable. A comparison of the eligible and analysis samples showed significant differences in participation rates by gender, race/ethnicity and grades which could have impacted on the results. However, these differences had a minimal impact on the make-up of the analysis sample relative to the eligible sample. To account for any impact of attrition, each of these variables was included as a control in the multivariate analyses. • Relies on self-reports for outcome & most predictors. • Data is from single state, South Dakota & may not generalise to other geographic location, particularly those with lower rates of alcohol misuse. **Comments** • Examines relationship between exposure to different forms of alcohol advertising and subsequent drinking among USA adolescents & assesses whether exposure to an alcohol and drug prevention programme mitigates any such relationship. • Conducted alongside RCT of ALERT prevention programme. • Controls for participation in ALERT programme (grades 7-9) to allow for consideration of whether such participation moderates the effect, if any, of advertising on drinking behaviour. • Strengths are prospective design, focus on actual drinking behaviour instead of intention to use, assessment of different forms of advertising, use of multiple control variables to rule out alterative explanations of the effects (TV habits, other drinking predictors, social context, bonds with family, school and religion, attitudes and behaviour and demographics and treatment and examination of how exposure to school-based drug prevention programmes affects susceptibility to alcohol advertising. • Like other studies focused on exposures to alcohol ads aired on sport and late-night shows. Also, used Nielsen

			to alcohol advertising in grade 8 ad grade 9 drinking for 7th grade non-drinkers and 7th drinkers. Interactions between the ALERT programme and the significant advertising predictors were tested.			data to weight the respondents' viewing patterns and thereby take into account how often alcohol ads were shown on the relevant programmes. Authors believe measures provides more accurate picture of adolescent exposure to alcohol ads on TV but could have missed exposure to advertising in sports or cable programmes. **Reported conclusions (by authors).** • Alcohol prevention programmes should foster media awareness by taking into account the multiple sources of alcohol advertising to which young people are exposed. • Helping children become aware of and able to counter these forms of advertising is important component of alcohol prevention programmes. • Future research should focus on how to counter impact of 'special venue' advertising on youth who have already started drinking. • Multiple models of ads influence subsequent drinking during mid-adolescence. • Adolescents exposed to ALERT Plus less likely to drink and less susceptible to persuasive appeal of in-store ads. • No single form of alcohol ads dominates for all youth. • Other non-advertising variables predict drinking; adult approval of drinking and insufficient parental monitoring were important risk factors.
Garretson & Burton (1998) USA Underage	Between-subjects study	**Study Setting:** A high school and a university, both in southeastern part of USA. **Sample at Baseline:** 267 respondents (133 under and 134 over the legal drinking age)	**Study Sample:** • Primarily senior-level students enrolled in business classes. Restricted to respondents who met or exceeded the state's legal drinking age of 21 years. 96% of this sample were between ages of 21 and 30. Mean age = 22.8 years. Median age = 22.0 years. • Underage sample consisted primarily of sophomore and junior-level high school students. Ages ranged from 15	Univariate results indicate two age groups hold different views about many aspects of perceived risks associated with consumption of alcoholic beverages. Those under the legal drinking age believe that the use of alcohol poses greater risks than do those over the legal drinking age (marginal means for	• Those over legal drinking age are more favourable toward alcohol (marginal mean = 4.34) and promoted brand (marginal mean = 4.34) than are those under the legal drinking age (marginal means = 3.73 and 3.57 respectively). • For the above-legal-age consumers, both attitude toward (t = 2.46;	**Limitations:** • USA legal drinking age 21 years. Although in underage sample ages ranged from 15-18 years, so possibly comparable. • Underage high school students and legal-college age students from a single city in the southeastern United States were used as subjects, and results might not extend beyond this specific sample. • Manipulations based on both existing warning regulations and comparison of what brand information presently can be included on a sales promotion item versus what could be included under recently proposed alcoholic beverage legislation. Findings might not extend beyond the specific warnings, brand manipulations, and treatment exposure conditions used. • Stimulus used was sales promotion item (t-shirt). Results

			to 18 years and the mean and median ages both were 16.0 years. • Of total sample approx three-fifths of the sample were men (61%), and gender percentages did not differ across the high school and college samples (chi-square <1.0, df = 1, ns). **Outcome Measures:** • General attitudes to alcoholic beverages and attitude toward brand. • Warning-related attitudes. • Risk perception measures. **Data analysis:** MANOVAs with follow-up univariate tests.	under-age and above-age consumers are 4.5 and 3.7 respectively.	p < .025) and believability of the message (t = 2.08; p < .05) are more favourable than for the brand-only condition. Neither difference is significant for underage consumers.	should be interpreted only for this promotional domain, because they might not extend to other promotion types (e.g. advertising). • Addresses only a single, initial exposure to promotion item and uses a well-known brand and brand character, based on pretest results. Focuses on differences between various treatment and control conditions, but results could differ under conditions of repeated exposures and for different brands and characters. **Comments:** Debate regarding influence of brand characters on attitudes and beliefs centered on whether use of such a brand character has influenced attitudes and behaviours of young consumers: http://www.ncbi.nlm.nih.gov/pubmed/1956101). **Reported conclusions (by authors):** • Better understanding needed of how and why attitudes differ between the over- and under-legal-age consumers. • Those under drinking age have a less favourable attitude toward alcohol and the social concern of the beverage marketer and believe there are higher risks associated with the use of alcohol. It should be noted that, though age-related differences were found, the effect sizes were small to moderate. • Significant interactions between brand information and age group for attitude and believability of warning message. Because legal-age college students reacted more favourably toward message when it appeared with brand and character, perhaps warning information on college campuses should include such characters. • Inclusion of a brand character neither altered attitudes toward promoted brand or alcohol nor influenced consumers' perceptions of risks associated with consumption of alcohol. • Attitude toward item was significantly greater when a brand character was included, compared with when only brand name was shown.

Hurtz et al. (2007) **USA** **Underage**	Cross-sectional survey	**Study Setting: California middle schools.** **Sample at Baseline:** 2125 sixth, seventh & eighth graders in 3 California middle schools.	**Study Sample:** 2125 (78% participation rate). **Outcome Measures:** ▪ Alcohol use (adolescent, parental, peer) ▪ Exposure to alcohol promotion (retail advertising, owning alcohol promotional items) ▪ Psychosocial risk factors for alcohol use **Data analysis:** Odds ratios. Pooled multiple logistic regressions.	▪ 2/3 of middle school students reported at least weekly visits to liquor, convenience or small grocery stores where alcohol advertising is widespread. Such exposure was associated with higher odds of ever drinking, but was not associated with current drinking. 1/5 students reported owning at least 1 alcohol promotional item. These students were 3 times more likely to have ever tried drinking and 1.5 times more likely to report current drinking than students without such items.	**Limitations:** ▪ Cross-sectional design. ▪ Adolescents who drink may be selectively exposed to alcohol ads in stores & APIs. ▪ Possible that some other, unmeasured variable may underlie observed relationships in this study. ▪ Quantity of alcohol consumed by those who reported current drinking not assessed. ▪ Cannot assume that all adolescents exposed to ads paid equal attention to them. ▪ Without taking into account influence of other sources (e.g. broadcast media) it is difficult to determine unique impact of store advertising on alcohol use. ▪ Conducted in a single California community, thus additional research is needed to determine generalisability to other communities. Although sample typical for California, large Hispanic population is not relevant for a UK setting. **Comments:** ▪ Although previous research demonstrated relationship between college students' exposure to alcohol ads in stores and their binge drinking (Kuo et al 2003), preponderance of alcohol ads in stores may also have an impact on younger audiences. ▪ Consistent with research demonstrating that adolescents' exposure to other forms of alcohol advertising, such as TV and magazine ads, promotes alcohol use (Martin et al 2002, National Research Council and Institute of Medicine 2003). **Reported conclusions (by authors):** ▪ Association of owning APIs and alcohol use persists even after controlling for social influences, such as exposure to peers who drink, and individual differences, such as propensity for risk taking, as well as parent characteristics including parent alcohol use and maternal supervision.

Kuo, M. et al (2003) USA Binge Drinkers	Correlation study	**Setting** **Sample at baseline** 25,585 Students at 119 colleges in 38 states and the district of Columbia. Study uses student self-report data from 2001 College Alcohol Study (CAS) & direct observational assessments of alcohol establishments	**Study Sample** 2001 CAS response rate 52% (n=10,904). Analytic sample 10,823. At 188 college sites, 1684 off-premise and 830 on-premise establishments were observed. 1 college dropped as no data about on-premises establishments. 69% attended public colleges and 31% private colleges. Alcohol environment assessments of neighbourhoods surrounding the college campuses were conducted at each of the 119 participating colleges. Observations were conducted in 8 on- and 20 off-premises beer venues within a 2-mile radius of participating colleges. **Outcome measures** CAS survey - college-binge-drinking rate High school binge drinking Past 30-day drinking rate and annual drinking rate Total number of drinks in past 30 days. Off-premises establishment index score – included summed score of 5 items; sale of party balls or kegs, low sales price on 12 and 24-packs, any beer promotions and exterior and interior ads	The off-premise establishment index score was significantly related to college binge-drinking rates (r=0.39, p<0.001). Indicating that campuses with higher off-premise establishment index scores had higher binge-drinking rates. The on-premise establishment index score was significantly related to college binge-drinking rates (r=0.42, p<0.0001). Indicating that campuses with higher on-premise scores had higher binge-drinking rates. The total alcohol environment score was significantly correlated with college binge-drinking rates (r=0.49), past 30-day drinking rates (r=0.41), and past year drinking rates (r=0.35). The higher the alcohol environment score, the higher the percentage of binge drinkers, past-30-day drinkers or past-year drinkers on campus. Off-premise establishment index score was positively associated with the total number of drinks consumed by the students in the past 30 days. The total alcohol environment index score was positively associated with the total number of drinks consumed by the students. The mean total alcohol environment score for the 118 colleges was 5.18+_1.76. Results showed significant regional differences – north-central region had significantly higher scores than south and west but not the northeast region. Scores did not differ significantly by school size. Also no significant difference between rural and urban areas.	**Limitations** • CAS subject to limitations of self-report surveys, although such surveys are widely used and considered generally valid in examining alcohol responses. • Potential bias may have been introduced through non-responses. However, several procedures were used to test for this in both surveys with no evident effect on findings. • As correlation study, causation can not be determined. **Comments** • Aimed to describe alcohol environments surrounding college campuses and the effects of these environmental factors on students' drinking. • Heavy episodic or "binge" drinking defined as consumption of ≥5 drinks in a row for men or ≥4 drinks in a row for women, at least once in the past 2 weeks. • For CAS surveys data was weighted based on gender, age, and ethnicity to account for colleges' varying sampling frames. • Student distribution at public and private colleges approximated USA national distribution of 68% and 32% respectively for full-time 4 year colleges. • The final model controlled for college response rate as this varied and could have impacted on the results. • Study included more detailed factors, than previous studies, such as weekend price specials, promotions and large-volume discounts which specifically target students. • Obtained direct observations by trained observers about marketing practices near college campuses instead of relying on student recall which can be influenced by respondents own drinking behaviour. • Data about students' own drinking and about marketing practices came from 2 independent sources. • Binge-drinking rate almost identical to those found in other national surveys of tobacco use and illicit drug-use rates. **Reported conclusions (by authors).** • As this is a correlation study, causality cannot be determined. Marketing practices that reduce cost may increase drinking levels, and heavy drinking by students

			On-premises establishment index score – included summed score of 8 items; beer specials, special promotions in the following 30 days, low sale prices, interior and exterior signage, promotions, no interior or exterior signage of alcohol warning and any age verification policies . Total alcohol environment score – sum of on- and off-premises establishments' index scores. **Data analysis** % of characteristics of on-and off-premises establishments were reported & average % for each college campus was calculated. Pearson correlation coefficients were used to examine association between average % for each college campus & college binge-drinking rates among 118 schools. Multiple regression analysis used to examine of on- and off-premises scores & total alcohol environments scores had effects on total number of drinks consumed in past 30 days.		may induce bars and restaurants to cater to and compete for their patronage through price lowering promotions. However, it is harder to maintain that high demand lowers prices. • Alcohol specials, promotions and advertising were prevalent in alcohol outlets around college campuses. • Availability of large volumes of alcohol, low sales prices, and frequent promotions and advertisements at both on- and off-premise establishments were associated with higher binge drinking rates on college campuses. • An overall measure of on- and off-premise establishments was positively associated with total number of drinks consumed.

Pedersen, P. J. 2002 USA Underage Binge Drinkers	Descriptive analysis and survey	**Setting** Large Midwestern university **Baseline sample** 863 students Gender: Male 40.1% Female 59.4% Age: Under 21 53% 21 & over 47% Ethnicity: Caucasian 77.9% African American 8.6% Spanish/Hispanic 3.9% Native American .03% Multiracial 1.6% 67.7% of sample reported binge drinking (71.8% of men, 64.9% women)	**Study Sample** Students from 28 general education courses invited to participate, 92% participated for total sample size 863. **Outcome measures** Descriptive analysis of alcohol ads in daily campus newsletter for 4 weeks before survey Alcohol use Print media reading Perceived influences of alcohol promotions on drinking behaviours **Data analysis** The alcohol advertising analysis was performed using a coding sheet. No other details were provided.	College students perceive that their drinking patterns are influenced by alcohol promotions in the campus newspaper. Self-identified binge drinkers were influenced significantly more than non-binge drinkers. Binge drinkers indicated that drink specials influenced how many night of the week they went out more than did non-binge drinkers ($p<.000$) Binge drinkers perceived a greater influence of alcohol promotion on what they ordered than non-binge drinkers ($p<.000$). Significant differences also found between binge and non-binge drinkers when asked about influence of drinks specials on how much they drank ($p<.000$) & on drink specials on which bar or club they went to ($p<.000$). Ad effect binge drinkers perceived significantly more influence of alcohol advertising across all 4 drinking behaviours than no ad effect binge drinkers. Findings consistent irrespective of sex, age or class. Alcohol advertising was present in every daily issue of student newspaper averaging 112 column inches per issue. Average of 26 ads per week with average of 6 appearing in each Tuesday, Thursday & Friday edition. 81% of all advertising was from 6 businesses aimed at students & within 1 mile of campus. 77.8% of ads offered alcoholic beverages at $1.50 or less per glass, beer or shot. Beer was focal beverage in 67.7% of advertisements.	**Limitations** • Data on consumption was self-reported. • Study focused on only 1 university campus so results may not generalise to other geographic locations. • Limited to student perceptions and sampled students on 1 large Midwestern campus. • Cannot demonstrate causality. • Author recognises that alcohol marketing is pervasive & it is presumptive to suggest it is possible to accurately isolate influence of 1 particular marketing source. **Comments** • Examined perceived influence of alcohol advertising in a daily campus newspaper on drinking behaviours of students. • Data from 2 sources: descriptive analysis of alcohol ads in the student newspaper and a survey questionnaire of students. • Alcohol use questions were based on those used in previous national or large-scale studies. In addition 3 substance abuse specialists currently working in college health reviewed questionnaire for content validity. • Binge drinking was defined as 5 or more (men) or 4 or more (women) drinks at 1 sitting, 1 or more times during 2 week period. • Coding sheet for content analysis alcohol ads was pilot tested and adjustments made. • 2 independent raters coded all ads. Interater reliability for all variables met or exceeded .94. **Reported conclusions (by authors).** • College students perceive that their drinking patterns are influenced by alcohol promotions in the campus newspapers. Furthermore, self-reported binge drinkers are influenced significantly more than non-binge drinkers. • Future work needs to move beyond perceptions and identify correlations between advertised info & students' actual alcohol consumption.

Saffer & Dave (2003) USA Underage Binge drinkers	Longitudinal study	**Study Setting:** USA adolescents (1996-1998). **Sample at Baseline:** Two datasets: 1. Monitoring the Future (MTF) survey: **63,000** high school students (8th, 10th & 12th graders). 2. National Longitudinal Survey of Youth (NLSY): approx. **10,000** youths aged 12-16 yrs old. Data includes individuals who are not in school & data from parents.	**Study Sample:** As baseline. **Outcome Measures:** ▪ Causal link between alcohol advertising & youth alcohol participation (consumption). ▪ Price elasticises. **Data analysis:** Empirical analysis.	▪ Models estimate current period consumption as a function of current or past period advertising. ▪ Advertising price strongly affects the level of advertising, but has no direct effect on youth alcohol participation. ▪ Overall, the results indicate that males participate more than females and that male participation is explained more by demographics than public policy. ▪ Past month price-participation elasticity was estimated at about -0.28 and price-binge participation elasticity was estimated at about -0.51.	**Limitations:** ▪ Includes only local advertising. ▪ In NLSY97 data set, controlling for individual heterogeneity increases the effects of advertising. This suggests the results from the MTF may understate the true effects. **Reported conclusions (by authors):** ▪ Since two datasets are independent, basically similar findings increase confidence in results. ▪ Results from MTF and NLSY97 generally show that alcohol advertising has a positive effect on annual alcohol participation, monthly participation and binge participation. Alcohol price generally has a negative effect on these participation measures. ▪ Overall, results indicate that blacks participate less than whites and their participation cannot be explained with the included variables as well as it can for whites. ▪ Price and advertising effects generally larger for females, but otherwise the coefficients are about the same. ▪ Elasticity of advertising with respect to past month participation was estimated at about 0.08 and with respect to binge participation at about 0.14. ▪ Complete elimination of alcohol advertising could reduce adolescent monthly alcohol participation by about 24 percent and binge participation by about 42 percent. ▪ Price elasticises for past month participation estimated at about –0.28 and binge participation elasticity at about –0.51. This suggests that a 100% increase in alcohol prices would be needed to reduce adolescent monthly alcohol participation by 28%, and this would reduce binge participation by 51%t. For monthly participation, effect of a complete elimination of alcohol advertising would be similar to 100% increase in alcohol prices. For binge participation, the effect of a complete elimination of advertising would be equivalent to about an 80% increase in price. ▪ Both advertising and price policies have potential to substantially reduce adolescent alcohol participation.

Smith, A., Edwards, C. and Harris, W. (2005) Australia Underage	Observational study and semi-structured interviews	**Study Setting** Bottleshops in the Brisbane Waters Local Area Command (LAC) **Sample at Baseline** 43 bottleshops, 3 were not included as premises restricted to minimal or no displays of any alcohol products. Staff in observed bottleshops	**Study Sample** 40 bottleshops Random sample of staff members at 12 bottleshops **Outcome Measures** Number of glass-door fridges Semi-structured interviews where asked about experience of secondary supply of alcohol. Opinions & experience of selling RTDs. **Data analysis** Not reported.	567 glass-door refrigerators. 229 displayed RTDs. Comprises 40.3% of all glass-door fridges at bottleshops in the Brisbane Waters LAC. All staff in sample had been questioned about secondary supply of alcohol. ¾ of respondents claimed to have been abused by patrons when tried to reduce secondary supply of alcohol. In the majority of cases, staff described this abuse as happening sometimes or often. Abuse included verbal abuse/threats and instances of damage to property. None of staff reported being physically abused themselves, several reported instances of their colleagues being physically abused at the workplace as result of intervention in the secondary supply of alcohol. ¾ nominated RTDs as sort of products most likely being purchased when abuse occurred. 10 of 12 staff nominated that they had sometimes or often noticed teenagers pointing out specific products for older people to buy for them. All nominated RTDs as product most likely pointed out. All staff believed RTDs most likely to appeal to younger women, with more than ½ believing products appealed to girls under 18. Some also believe products appealed to under 18 males. Some staff explained methods of liquor companies marketing strategies for RTDs. Including provision of expensive fridges free providing stocked exclusively with RTDs & positioned so can be seen from outside through doors & window. Staff believed need for more enforcement and greater visibility & presence of police.	**Limitations** • Results only generalisable to specific area of study. • No consumption outcome so can't actually link displays with actual consumption. • No background information on staff members. • Data analysis was not reported. **Comments** • Aimed to investigate the marketing of 'ready to drink' (RTDs) category of alcoholic beverages through bottleshops. • Preliminary visits to bottleshops indicated that the primary marketing strategy for RTDs was display of the product in glass-door refrigerators. Thus decided that the number of glass-door fridges would be an accurate indicator of the level of marketing of RTDs within bottleshops. **Reported conclusions (by authors).** • Although further research is required in this area including focus groups with adolescents on RTDs. • Already high level of consumption of RTDs by under 18s. • There is very strong marketing of these products by the liquor industry which will further compound already high-risk level of consumption by young people.

Yang & Raghubir (2005) USA	Empirical study	**Study Setting:** **Study 1:** Undergraduates on an introductory marketing course (completed task for partial course credit). **Study 2:** Purchases of 3 light beers from Jan 97 to Sept 98. **Study 3:** Field experiment by Miller Brewing Company. North Carolina, Illinois, Ohio, Texas, Florida, California. **Study 4:** Undergraduates on an introductory marketing course (completed task for partial course credit). **Sample at Baseline:** **Study 1:** 60 participants **Study 2:** 22,639 purchase occasions. **Study 3:** 842 adults. **Study 4:** 57	**Study Sample:** **Study 1:** 58 undergraduate students (2 from baseline did not complete the measures so removed from analysis) on marketing course (asked to imagine they were 21). Male=27, Female=31 Average age 21.42 yrs (under 21=15, 21=31, over 21=13, non-report=1). Mean reported consumption 3.10 beers per week. **Study 2:** 22,639 purchase occasions (from scanner panel data collected by A.C. Nielsen) for Bud Light, Miller Light and Coors Light (brands account for 80% of total light beer market). **Study 3:** 842 respondents selected through mall-intercepts. 50% age 21-34. 50% age 35-50. 75% male (n=631). To be included, respondents had to have drunk at least six units of 12oz beer a week. Median weekly beer consumption 9 bottles (12oz). Median weekly beer expenditure $15. **Study 4:** 57 undergrad students on marketing course. Average age 21.70 years (under 21=11, 21 yrs=32, over 21=14). Male=28, Female=29. Mean reported average	**Study 1:** More elongated beer bottle perceived to contain almost 20% more beer than beer can. No moderating effects of age or gender. Elongation bias significant for all groups: non-drinkers estimated beer bottle to contain over 25% than the beer can, lighter drinkers estimated over 16% larger, heavier drinkers over 15% larger. Age and gender did not moderate the effects. **Study 2:** Scanner data for light beer purchases showed when bottles purchased the quantity was lower than when purchasing cans of same size, holding price and promotional events constant. Within each of these package shapes, purchase quantities are higher for shorter bottles (cans) than they are for taller bottles and cans. Consumers, who purchase both, purchase fewer bottles than they do cans. Though supply side issues and intrinsic differences between bottles and cans could exacerbate these effects, they do not completely explain them. **Study 3:** Purchase quantity is lower when bottles versus cans are purchased. The results are intuitive: for example holding other variables constant, premium and imported beers generate more purchases, males and those under 35 yrs tend to purchase more beer, social situations generate more beer purchases compared with home-non-social situations. The size of the effect was stronger when the social context was home-social – the situation that best resembles a context where purchases reflect desired consumption. In home-social situations the effect of package shape on purchase quantity was the largest: people tended to purchase a smaller number of bottles versus cans of beer. Relationship between bottle and purchase quantity is the same for home-nonsocial and outside-social situations as the interaction between bottle and	**Limitations:** **Study 1:** ▪ Low variance in measure of product category experience in sample (primarily non-drinkers or light-drinkers). ▪ May not generalize to overall beer drinking population (college aged sample of students in an laboratory study). ▪ Study stopped at examining volume perceptions and did not test for purchase quantity. ▪ Marketing students. **Study 2:** ▪ Two major supply-related factors could have led to same pattern of results: ▪ Differential availability of large package sizes for bottles versus cans. ▪ Other intrinsic differences between bottles and cans, such as differences in materials, weight, fragility, stackability, recycling ability etc. ▪ Both could account for higher purchase quantities for cans versus bottles, even when price and promotion are controlled. ▪ As data for light beer might have favoured hypothesis (that people buy fewer bottles than cans). ▪ Did not control for potential differences between cans and bottles (e.g. stackability). **Study 4:** ▪ Marketing students. **All studies:** ▪ Beer bottles and cans do differ on several dimensions other than elongation. ▪ Did not examine other psychographic and situational variables that could lead to preference of one type of container (e.g. would bottles be more likely to be purchased for special occasions?). **Comments:** **Study 1:** Effect is robust to measurement method (similar results were obtained with the responses to the agree-disagree statement regarding perceived volume of bottles vs. cans). **Study 3:** The main effect of whether the beer was heavy or light did not exert an effect, increasing the generalisability of Study 2 results (based on light beer purchase) to the population of beer

		participants (no overlap with study 1).	consumption of beer in a week was 4.86 beers (sample included 18 non-drinkers). **Outcome Measures:** **Study 1:** attitudes to bottles & cans, Alcohol usage **Study 2:** Relationship between purchase quantity and container type (bottles or cans). **Study 3:** Virtual shopping survey – brand choice, package choice, purchase quantity. Reasons like to drink beer. **Study 4:** Motivation to consume. Purchase quantity. Perceived volume. **Data analysis:** Conceptual model.	outside-social is not significantly different from 0. Age interacted with the effect of container shape on purchase quantity: younger consumers were more prone to purchasing a smaller number of bottles versus cans. Price coefficient was significant and negative, albeit displaying lower price elasticity than in Study 1, probably due to cost being less materially relevant in a simulated versus real shopping task. **Study 4: Those** reporting greater amount of beer drinking less prone to bias: while non-drinkers and lighter drinkers were biased, heavier drinkers were not. Gender did not affect bias. A 2x2 (package shape: bottle/can x motivation to consume: high/low) ANOVA on number of beers "purchased" for party, incorporating the perceived volume of a can and a bottle of beer as a covariate, showed a significant effect of motivation to consume. This main effect of package shape was not significant, but moderated effect of desire to consume. In condition where desire to consume was low and fixed, more cans than bottles were purchased. However, results reversed when desire to consume was high.	drinkers. Study 3 replicated and extended Study 2 results using a different method and approach, controlling for intrinsic differences in supply, price level and promotional activity. **Reported conclusions (by authors):** Four multi-method studies show that the more elongated a container, the lower its purchase quantity: ▪ Study 1 (in the lab) shows beer bottles are perceived to contain more than beer cans, particularly for infrequent beer drinkers. ▪ Study 2 analyses scanner data to show that the purchase quantity of cans is 63.66% higher than bottles. ▪ Study 3 (a virtual shopping survey) demonstrates these effects are strongest when the context is socialising at home. ▪ Study 4 (in the lab) shows results only hold when desired consumption level is constant.

Table 9 Studies linking broadcast media advertising and consumption

Authors Country	Study Design	Sample and Interventions	Methods	Consumption Outcomes	Other Outcomes	Limitations and Conclusions
Aitken at al (1988) UK Underage	Survey	**Study Setting:** Greater Glasgow area June-July 1987. **Sample at Baseline:** 433 children.	**Study Sample:** 110 children at each of 4 ages levels: 10-11, 12-13, 14-15, 16-17. 51% boys, 49% girls. Social class: 55% children of C2DE parents and 45% children of ABC1 parents). **Outcome Measures:** Attention to alcohol advertising • Appreciation of alcohol advertising • Under-age drinking **Data analysis:** Multiple discriminant and multiple regression analyses.	Major differences in perceptions of alcohol advertising between drinkers and non-drinkers even when other important predictors of under-age drinking were held constant. The differences between under-age drinkers on the one hand and triers and non-drinkers on the other with respect to *Number of alcohol advertisements correctly identified* were independent of age, peer group drinking, parental attitudes towards under-age drinking and a range of other variables. Furthermore, although there were no significant differences between drinkers and triers with respect to *Alcohol advertising appreciation* when other variables were held constant, the differences between drinkers and non-drinkers were significant.	• Only 7% unable to name brand of alcohol advertised on TV, only 6% unable to identify at least one photo of a TV ad for alcohol and 61% identified 4+ • Although ability to identify imagery in TV advertisements for alcohol increased as function of age, majority of children able to name brands associated with four photos of TV lager ads • Although proportions increased as a function of increasing age, a majority of the children in each age group said they could think of a TV ad for alcohol that they liked. • Consistent differences between boys' and girls' responses: boys tended to name more brands of drinks advertised on TV and tended to be more adept at recognizing and identifying brand imagery from photographs of TV ads for alcoholic drinks.	**Limitations:** • Advertising does not necessarily play a part in inducing children to start drinking. Cause-and-effect relationships are difficult to disentangle. For example, attitudes towards alcohol advertising may become more positive *after* children start drinking. **Comments:** • Sex and social class controls reflect population structure of the Greater Glasgow Area. • Survey consistent with previous qualitative research (Aitken at al 1988). • Brands most frequently mentioned were for mass-produced beers and lagers. • No consistent differences in perceptions of alcohol advertising between children of working- and middle-class parents. **Reported conclusions (by authors):** • Majority of children of 10 and above are very much aware of TV advertisements for alcoholic drinks. • Children's answers to questions about *specific* advertisements indicate that the majority of children of 10 and above enjoy watching TV ads for alcohol. • Ads aimed at older teenagers and young adults present qualities that younger teenagers also find attractive. Under-age drinkers tend to be more adept at recognising and identifying the brand imagery in TV ads for alcoholic drinks - suggests they tend to pay more attention to TV alcohol commercials. Under-age drinkers tend to be more appreciative than non-drinkers of TV ads for alcoholic drinks. This suggests that under-age drinkers are getting more pleasure out of TV alcohol commercials.

Atkin, C. K., Neuendorf, K. & McDermott, S. (1983) USA Underage Binge drinkers	Correlation study using correlational survey & message response study.	**Study Setting** USA **Sample at Baseline** Gender: 49% male, 51% female. Race: 84% white, 12% black, 4% Chicano or Oriental. Age: 17% in 7th -8th grade, 19% in 9th-10th grade, 18% in 11th-12th grade, 17% 13th-14th grade or aged 18-20, 16% in 15th-16th grade or aged 21-22 & 13% 23-77 years old.	**Study Sample** 1227 respondents predominantly 12-22 year olds. **Outcome Measures** Correlation study measured: alcohol consumption, specifically excessive drinking & hazardous drinking. Questions on hazardous drinking considered activities that would be hazardous while drunk & measured perceived safety of seven activities in a drinking context. Alcohol advertising exposure: responses were used to classify participants as having high or low exposure to. Response study measured reaction to number of specimen advertisements. **Data analysis** Regression analysis	Correlation survey: For level of alcohol advertising 614 were in high exposure group & 613 in the low exposure group. The exposure index correlates +.30 with the heavy drinking index. Participants classified as highly exposed to alcohol advertisements consumed 4.5 drinks during an evening compared to 2.9 for those with lower exposure. In the high exposure group 24% say they have at least 5 or 6 drinks at least once per week, which is double (12%) the proportion for the less exposed respondents. The index of drinking & driving is correlated +.26 with advertising exposure. 39% respondents in high exposure have driven after drinking in past month compared to 25% in low exposure group.	Message response study: an average of 79% replied "large amount" when asked if the (sponsoring brand) company wants a person to drink a large, medium or small amount suggesting that the heavy drinking appeal was perceived. An average of 34% considered occasional heavy drinking to be acceptable. However, the response from a control group who did not see the advertisements were very similar indicating that the advertisements didn't influence this basic assumption. The advertisements also did not seem to have a perceptible impact on attitudes toward heavy drinking. The persons exposed to the adverts are equally or less likely to feel that activities is safe to perform while drinking indication that the adverts did not have a negative influence on safety attitudes.	**Limitations** • Investigated relationship between alcohol advertising & alcohol consumption in 1983. Changes in alcohol advertising practice & social and cultural changes may mean findings no longer applicable. • Reports on a nationwide survey of Americans meaning that the findings may not applicable to other countries. • Data on alcohol consumption is self-reported. • Limited by correlational design. Definitive causal implication cannot be drawn from correlation data, since a reverse flow of influence may be operating as heavy or hazardous drinkers see out advertisements for reinforcement of their practices. • Research using more sophisticated measures is needed to examine impact more precisely, & provide more detailed findings regarding these harmful consequences of advertising. • It would have been useful to have findings for adolescents separated from findings for adults. No major differences in patterns of relationships for beer, wine, or liquour advertising exposure or between adolescents & adults so survey results are provided together not itemised. **Comments** • Investigates impact of advertising on excessive or heavy drinking beyond normal levels. Secondly, considers whether advertising is responsible for alcohol consumption in context of automobile driving & other activities which may be hazardous when combined with drinking. • Judgemental sampling used to obtain persons with diverse characteristics & backgrounds representative of the broader population along key demographic attributes. • Advertisements selected to represent excessive consumption appeals & hazardous portrayals. • Moderately positive correlation between amount of day-to-day exposure to beer, wine, & liquor advertisements & excessive alcohol consumption remained significant after regression analysis controlled for all interpersonal

						influences & demographic variables. **Reported conclusions (by authors).** • Mass media advertising for alcohol plays a significant role in shaping young people's attitudes and behaviours regarding excessive or hazardous drinking. • Moderately positive correlation between amount of day-to-day exposure to beer, wine, & liquor advertisements & both excessive alcohol consumption & drinking in hazardous contexts such as automobile driving. • Advertising stimulates consumption levels which in turn leads to heavy drinking & to drinking in dangerous situations. • When respondents are shown specimen advertisements depicting excessive consumption themes or hazardous driving situations, these concepts are readily perceived & many infer an implicit endorsement of such behaviour by the sponsoring companies. • Has implications for designing alcohol abuse education messages that can effectively counteract impact of advertising.

Austin, E. W., Chen, M. & Grube, J. W. 2006 USA Underage	Longitudinal study (survey)	**Setting** 9 counties in the San Francisco bay area **Baseline sample** 786 recruited (n=652) participated. Gender: 53% male, 47% female Ethnicity 47% Caucasian American 20% Latino American 10% Asian and Pacific Islander American, 8% African American, 2% Native American, and 13% multi-ethnicity & ethnicity unknown. Age rang: 9-17 yrs (mean [SD] = 12.8 [2.21])	**Study Sample** 652 USA youths (aged 9-17 years) **Outcome measures** Alcohol use – frequency of drinking alcohol in past 12 months, beverage-specific frequency & usual quantity consumed in the past 30 days for 4 categories of alcoholic beverages (beer and malt liquor, wine cooler wine and liquor). TV viewing, magazine readership, scepticism, alcohol ad desirability & identification, alcohol expectancies, liking of beer brands, liking of/desire for beer toys & brands, & parental guidance. **Data analysis** Latent variable structural equation models.	23% reported drinking alcohol in past 12 months & 15% reported alcohol use in 30 days, with no significant gender differences. Few of the youth aged 9-11 (n=207) reported alcohol use: 3 reported past-12-month use and 1 reported past-30-day-use. Youths aged 12-17, 31% reported past-12-month use and 21% reported past-30-day-use. Scepticism was negatively associated with positive affect toward alcohol portrayals and positively with the desire to emulate characters portrayed in alcohol advertisements. These, in turn, predicted experiences and liking of/desire for beer toys and brands, which predicted alcohol use. Parental guidance decreased alcohol use directly and indirectly by lessening influences of positive affect toward advertising.		**Limitations** • Only limited information provided about sampling method. • May not generalise to other geographic locations. **Comments** • Investigates how persuasive media messages for alcohol use lead to concurring beliefs and behaviours. • Wine and wine cooler consumption combined as they were very low. **Reported conclusions (by authors).** • By testing a theoretical model of information processing, this study has demonstrated that interpretations of messages are at least as important as media exposure to adolescent alcohol use. • Media alcohol portrayals influence children's drinking through a progressive decision-making process, with its influence underestimated by typical exposure-and-effects-analyses. • Results, although demonstrating complexity of decision making, also demonstrate complexities of measurement. Scepticism and desirability appear double-edged with logical as well as affective characteristics. • Scepticism appears to increase individuals' awareness of advertising technique while simultaneously reducing individuals' susceptibility to them. Awareness of seductive nature of advertisements comprises a necessary component of scepticism. • Further research should explore this issue further.

Calfee, J. & Schereaga, C. (1994) France, Germany, Netherlands, Sweden & UK	**Design** Econometric analysis	**Study Setting** Advertising & alcohol markets France, Germany, the Netherlands, Sweden & UK **Sample at Baseline** Data for France 1971 – 1989, Germany 1972-1989, the Netherlands 1968-1989, UIK 1975-1991, Sweden.	**Study Sample** France, Germany, the Netherlands, Sweden & UK. **Outcome Measures** Per capita alcohol consumption **Data analysis** Regression modelling.	Advertising not found to have any influence on consumption. Of 16 estimated coefficients, only one (Germany) even approached significance in a positive direction. Supporting this observation is the fact that in Sweden, where advertising has been prohibited since 1979, the working of the other variables (price, income & trend variables) were very similar to what we observed in markets with advertising particularly the Netherlands & UK. This suggests that even a complete ban on advertising has little effect on the alcohol market.	**Limitations** • Most recent data used was 1991. Changes in these nations' economic markets since then mean that findings of this study might not be applicable to today's situation & therefore findings should be interpreted with caution. • Omitted variables could have caused analysis to miss influence of advertising. Authors' view is that this is unlikely. **Comments** • Studies influence of advertising on alcohol consumption by presenting a literature review & an econometric analysis of extent to which advertising affects per capita alcohol consumption in France, Germany, Netherlands, Sweden (where alcohol advertising has been prohibited since 1979) as well as a new analysis of UK. • Data extraction table focuses on econometric analysis. • To facilitate comparison essentially identical approaches used for each of 4 nations with Sweden handled differently. • Extent to which advertising affects per capita alcohol consumption was assessed after taking into account: price of alcoholic beverages & changes in per capita disposable income. • Statistical results for France, Germany, the Netherlands & UK were broadly consistent with previous research on UK & USA. • Used a simple robust model developed by McGuinness to study UK alcohol market. • Assessed validity using several econometric models to take into account possibility that effects of advertising and other variables were obscured by effects of variables not included in analysis. **Reported conclusions (by authors).** • Supports view that advertising does not have substantial effect on alcohol sales. • Social forces other than price & income were bringing about a stronger reduction in demand for alcoholic beverages during the 1970s & 1980s & that advertising did nothing to ward off the trend.

Caswell & Zhang (1998) New Zealand	Longitudinal study	**Study Setting:** Birth cohort assessed every few years, most of them in their home city of Dunedin, NZ. Questions about alcohol are asked as part of the day-long assessment. **Sample at Baseline:** 1661 babies born in a Dunedin hospital during 1972. Present analyses draw on data collected from the sample when they were 18 and 21 years and were collected in the years 1990/91 and 1993/94.	**Study Sample:** 921 in phase 18 years old. 942 in phase 21 years. A structural equation model was analysed in the present study with the combined sample size of 630 of those who drank beer at age 18. The selection of beer drinkers for analysis in this study was because the majority of the advertising to which the sample was exposed was for beer. **Outcome Measures:** Responses to questions to beer consumption, liking for advertising, favourite brand of beer and self-reports of alcohol-related aggressive behaviour. **Data analysis:** Structural equation modelling	• Average volumes of absolute alcohol consumed in the form of beer 13.6 and 20.3 l per person at age 18 and 21 respectively. Medians were 5.9 and 9.5 l, and 95 percentiles were 50 and 77 l per person, respectively. • There are significant paths from liking of advertisements and brand allegiance at age 18 to beer consumption at age 21. However, while brand allegiance at age 18 had a positive impact on beer consumption at age 18 there was no impact of liking for advertising at age 18 on consumption at age 18, nor was there any evidence of hypothesized reciprocal paths from consumption at 18 to liking for advertising and brand allegiance at age 18. • Hypothesized relationship of beer consumption at 18 affecting beer consumption at 21 significant but small relative to other relationships in model.	Three items assessing people's experience of problems associated with aggression were used in the present analyses. These were: "being told to leave a place because of your drinking"; "got into a physical fight because of your drinking"; "been involved in a serious argument after you have been drinking". The proportions of the sample responding that they had experienced each of these were 16%; 23% and 30% respectively.	**Limitations:** • Self-reported data on alcohol-related aggressive behaviour. • Generalizability? – at time of data collection, minimum legal drinking age in NZ age 20. **Reported conclusions (by authors):** • The volume of beer consumed at age 21was significantly influenced by all the three variables measured at age 18: volume of beer consumed; liking for alcohol advertising and brand allegiance. Of these brand allegiance and liking of advertising had stronger impacts on the volume consumed at age 21 than did the volume of beer consumed at age 18, and liking for advertising had the strongest relationship: a standardized coefficient of 0.36. • The relationship between brand allegiance and volumes consumed was present at both ages 18 and 21. The results showed that having a preference for a specific brand, and also having a preference for the brands of which the imagery was in keeping with the traditional Kiwi values of masculinity and hard physical activity, were associated with the consumption of larger volumes. • Liking of advertisements not associated with volumes of alcohol consumed at time it was measured, when sample was aged 18, but did have a significant impact on drinking levels measured 3 years later. • Gender was a significant variable. Men liked the advertising more and were also independently more likely to consume large amounts, more so at age 21 than at age 18. There was however no direct effect of gender on reports of aggression; this appeared to be mediated entirely through the effects on consumption levels. • Strong relationship between volume consumed at age 21 and experience of aggression associated with drinking.

				• Relationship between beer consumption and experience of alcohol-related aggression was also significant. • Gender found to be significantly related to liking for advertising and beer consumption at both 18 and 21.		

Center on Alcohol Marketing and Youth (2003b) USA Underage	Audit	**Study Setting:** Hispanic youth (ages 12-20 yrs) in 2002. **Sample at Baseline:** Hispanic population in USA 35.3 million: 40% of this population under 21 yrs.	**Study Sample:** Hispanic Youth population in USA. Outcome Measures: **Exposure to alcohol magazine, TV and radio advertising**. **Data analysis:** Gross rating points	None	Magazines: In 2002, youth in general saw 21% more advertising than adults for all alcohol, and 26% more advertising for distilled spirits (the largest category of magazine alcohol advertising). Hispanic youth even more exposed than other youth: saw 24% more alcohol advertising in English-language magazines than non-Hispanic youth, saw 24% more ads for beer and ale, 24% more for distilled spirits, 32% more for low-alcohol refreshers such as Smirnoff Ice and Mike's Hard Lemonade. Radio: Distilled spirits advertisers reached Hispanic youth 11% more effectively than non-Hispanic youth, while marketers of low-alcohol refreshers reached Hispanic youth 14% more effectively. Hispanic youth heard roughly the same amount of beer and ale advertising as non-Hispanic youth. All of these overexposed youth populations in general. TV: Audience viewing data not available. Of 15 most popular programs among Hispanic youth aged 12-20 yrs, 12 had alcohol advertising in 2002.	**Limitations:** ▪ Different population ▪ Consumption link not investigated. ▪ Conclusions based on alcohol ad occurrence data and audience data – no survey of youth conducted. ▪ Underage in USA below 21 yrs. **Comments:** ▪ Audits exposure of Hispanic youth to alcohol magazine, TV and radio advertising in 2002. **Reported conclusions (by authors):** ▪ Hispanic youth saw even more alcohol advertising in magazines than non-Hispanic youth. ▪ Hispanic youth heard more alcohol advertising on radio than non-Hispanic youth. ▪ Alcohol advertising was placed on a majority of TV programs most popular with Hispanic youth.

Center on Alcohol Marketing and Youth (2003c) **USA** **Underage**	Comparative study	**Study Setting:** African-American youth (ages 12-20 yrs) in 2002. **Sample at Baseline:** 36% of African-Americans under 21 yrs.	**Study Sample:** African-American Youth population in USA. **Outcome Measures: Exposure to alcohol magazine, TV and radio advertising. (Comparison with non-African-American youth.)** **Data analysis:** Gross rating points	None	**Magazines:** African-American youth saw 77% more alcohol advertising in national magazines than did non-African-American youth. African-American youth saw 66% more advertising for beer and ale, 81% more advertising for distilled spirits, 45% more advertising for low-alcohol refreshers such as Smirnoff Ice and Mike's Hard Lemonade, and 65% more advertising for wine brands. **Radio:** Significant source of African-American youth overexposure to alcohol advertising in 2002. Distilled spirits advertisers reached African-American youth 56% more effectively than non-African-American youth, beer and ale 12% more effectively. Both these overexposed youth populations in general as well as overexposing African-American adults relative to non-African-American adults. **TV:** Audience viewing data not available. Alcohol advertising on 13 of the 15 prime time regularly-scheduled programs with the largest teen audiences (ages 12-17 yrs) for a sample week in 2001.	**Limitations:** ▪ Population may not be comparable to UK. ▪ African-American youth slightly over-represented in general youth population (36% vs. 30%). ▪ Underage in USA below 21 yrs. ▪ Consumption link not investigated. ▪ Conclusions based on alcohol ad occurrence data and audience data – no survey of youth conducted. **Comments:** ▪ Audits exposure of African-American youth to alcohol advertising in magazines and on radio and TV in 2002. **Reported conclusions (by authors):** ▪ African-American youth even more overexposed to alcohol advertising than non-African-American youth. ▪ Alcohol advertising was placed on all 15 of the TV programs most popular with African-American youth. ▪ Alcohol advertising in magazines overexposed African-American youth compared to non-African-American youth, reached underage African-Americans more effectively than young adult African Americans, and exhibited significant concentration of brands and magazines. ▪ Alcohol advertising on radio overexposed African-American youth compared to non-African-American youth and was concentrated in two formats and five markets.

Chen et al (2005) USA Underage	Cross-sectional study	**Study setting** California **Sample at baseline** Students from 2 public schools in California. Random sample of students in grades 9-11 from high school (n= 174) & all students in grades 5-8 from K-8 school (n=259). 89 students from grades 9-11 participated & 164 from grades 5-8 participated. Gender: 47% male, 53% female Age: 10-17 years old, mean age 12.7 years. Race: 50% Caucasian, 13% Latino, 6% Native American, 6% Asian and Pacific Islander, 0.4% African American & 25% multiple or other ethnicities.	**Study Sample** 253 children & adolescents **Outcome measures:** Affective responses to advertising – if liked, found funny etc Advertising effectiveness – if made you want to buy product. Alcohol use – frequency of alcohol use in past 12 moths. **Data analysis:** Structural equation modelling was used to examine the relationships investigated in this study.	Attractiveness of beer advertisements significantly & substantially predicted advertising attractiveness (p <.001) & effectiveness of beer advertising (p <.001). Frequency of alcohol use predicted ad attractiveness (p <.001) & effectiveness of beer advertising (p <.001). Alcohol use also had significant indirect effects on overall liking (p <.01) & effectiveness. Beers advertisements were considered more influential by younger respondents 7 males rated advertisements as more influential than females (p <.001).	3 most favoured advertisements had animal characters as leading character. Contrastingly, the least favoured advertisements either focused on products or portrayed adult scenes. The most favourable rated advertisements were also rated as the most influential i.e. wanting to buy product promoted.	**Limitations** • Ethnic diversity of students reflects that of California. Caution should be used when considering results in populations with different ethnic diversities. • Findings are from cross-sectional data and must be interpreted with caution. • Further research especially with a longitudinal design is needed to better understand the relationship between alcohol advertising & drinking among youth & determine causality. **Comments** • Investigates affective responses of youth toward specific elements in TV alcohol advertising & associations between advertising likeability & its potential influence. • Public schools in study selected as student population reflected state's ethnic diversity. **Reported conclusions (by authors).** • Youth's perceived likeability of beer advertisements is function of positive affective responses evoked by the specific elements from advertisements. • Alcohol advertisements rated by youths as more likeable were also endorsed with greater intention to purchase the brand & product promoted. • Policymakers should seek to encourage alcohol advertisers to avoid exposing youth to their marketing efforts, focus their advertisements on product-related characteristics & use content that is less appealing to youth. • May be worthwhile for counter-advertising measures targeting younger age groups to incorporate elements such as humour, youth orientated music & youth attractive characters & stores that appeal to their audiences.

Collins et al (2003). USA Underage	Correlation study (Survey)	Middle schools in South Dakota Baseline sample (n=1530)	**Study Sample** 1530 eighth graders from 20 middle schools in South Dakota, USA. Middle schools from which they were drawn were participating in a field trial designed to test effectiveness of a drug prevention programme. Current study included subset of students who were attending control schools during spring semester of 8th grade. **Outcome measures** A latent advertisement awareness variable was derived based on recognition of 6 masked beer ads, knowledge of beer brands & knowledge of beer slogans. Exposure to televised beer ads, frequency of reading magazines with beer ads & exposure to beer concessions. **Data analysis** Structural equation modelling was used to test for independent predictors of a latent beer advertising awareness construct, separately among boys	Beer advertisement awareness associated with drinking only among boys.	Adolescents with greater exposure to advertisements in magazines, at sporting and music events and on TV more advertisement more aware than those with less exposure, as were teens who watch more TV, pay attention to beer advertisements and know adults who drink. Beer advertisement awareness was dramatically higher among boys. Native American youths are less likely to be aware of beer advertising in South Dakota than are whites.	**Limitations** • Measure of awareness is composed primarily of indicators related to TV commercials, which may bias estimates of association with TV viewing patterns. • May not be generalisable to other geographic locations. • Important to keep in mind that particular forms of advertising exposure that drive advertisement awareness most strongly may be different in other countries. Different policy responses for reducing effects of such advertising on youth might be appropriate in other countries. • Most important limitation that did not test for or find evidence of a causal association between these variables. • Measures collected contemporaneously and it is possible that awareness of beer advertising leads adolescents to watch programming & read magazines that contain alcohol advertisements, & to attend or remember attending events that sell beer. • Controlled for variables thought most likely to play role in both reporting & actual advertisements awareness, while testing associations among the other factors. • Did not test for or demonstrate a causal effect of advertisement awareness on alcohol consumption, nor did previous studies. **Comments** • Aim is to identify correlates of beer awareness among adolescents at an age when most initiate use of alcohol. • Focus on beer for several reasons: in USA beer ads more pervasive than ads for other kinds of alcohol, beer ads are more likely to appear where adolescents might see them, & adolescents often drink beer when they do drink. • Measure of advertising awareness emphasises awareness of TV commercials for beer, but it also includes indicators of brand name and slogan awareness. Awareness of beer brands & slogans may result from experiences other than watching TV. • Restricted sample to control schools as drug prevention curriculum included discussion of alcohol advertising and how to avoid being influenced by it, and might therefore

			& girls.			attenuate relationships between advertisement exposure & advertisement awareness. **Reported conclusions (by authors).** • Key predictor of advertisement awareness among adolescents was exposure to beer advertising in its various formats. Strongest association was with TV commercials. • Boys more likely to be aware of and remember beer marketing, and may be more likely to drink as a result of this awareness than girls. There may be a beer advertisement culture among boys not present as strongly in girls. • Each of a variety of advertising venues appears to influence independently extent to which beer advertising is incorporated into an adolescent's cognitive world. Suggests importance of keeping in mind all venues in which adolescents might have contact with advertising when developing alcohol-advertising policy. • Appears that focus should be TV. Cannot be certain though that TV is as predominant an associate of beer advertisements awareness as findings suggest. • Awareness of beer advertising is important phenomenon for understanding extent to which alcohol marketing influences America's adolescents, and correlates of such awareness provide insight on process by which this occurs.

Collins, R. et al (2007) USA Underage	Longitudinal study Survey	**Study setting.** Elementary Schools in South Dakota, USA **Sample at baseline** 1959 grade 5 students from 39 schools. 91% completed additional survey at grades 6 and 7 (n=1786) Sample average of 11.8-year old at grade 6 (SD = 0.6). 51% female Ethnicity: 85% white, 12% native American 3% other race.	**Study Sample** 1786 South Dakota youths surveyed when grade 5's at baseline 2000 and in grade 6 and 7. Missing data resulted in analysis sample of 1699 youths for predicting drinking and 1740 for drinking intentions. **Outcome Measures** Exposure to TV beer ads, alcohol ads in magazines, in-store beer displays and beer concessions, radio listening time and ownership of beer promotional items during 6th grade. Past-year beer drinking measured at grade 7 Drinking intentions for coming 6 months at grade 7 **Data analysis** Multivariate regression equations predicted the two drinking outcomes using the advertising exposure variables and controlling for psychosocial factors and prior drinking.	15% at grade 5 & 17% at grade 6 reported that they had ever drunk a can or bottle of beer, 27% had by grade 7. 17% of youth reported past year beer drinking at grade 7. 16% "definitely" or "probably" would drink in the next 6 months; 23% "probably would not; 61% "definitely would not". Advertising exposure variables were all significant, positive predictors of grade 7 beer drinking and drinking intentions. TV sports beer ads, other TV beer ads, radio listening and ownership of promotional items were all significant predictors of drinking, all *p* values < .05. There were significant associations between drinking intentions and exposure to ads on programmes other than sport, exposure to magazines, and ownership of promotional items, all *p* values < .05.		**Limitations** • Boys more likely to be lost to follow-up. Results may not be truly representative of these groups. • Participants were from South Dakota, which ranks among the top ten states in binge drinking among adolescents. So results may not generalise to other locations, particularly those with low rates of alcohol misuse. • Study relies on self-report measures. • Did not conduct a comparative test of advertising effects on older adolescents so can't know if early adolescents is an especially vulnerable period but this is possible. **Comments** • Aimed to determine whether early adolescents who are exposed to alcohol marketing are subsequently more likely to drink. • Included various controls for known predictors of underage drinking. • Studies younger age group than other studies. Present study tested for alcohol advertising effects on youths exposed during grade 6, the youngest sample that has been studied longitudinally. • Study looked at wider variety of advertising than any previous study. Measures of TV, radio & magazine exposure tapped both high attention information processing and minimally-attentive processes by measuring likely exposures regardless of attention level or recall. • Uses measures of exposure validated in previous studies. • Tested effects on both underage drinking and intentions to drink in the near future. Ads might produce intentions that participants don't have chance to act on before follow-up survey. • Effects tested longitudinally to provide evidence regarding possibility of causal relationship. **Reported conclusions (by authors).** • Joint effect of exposure to advertising from all 6 sources at grade 6 was strongly predictive of grade 7 drinking and

				Joint effect of exposure to ads from all measured sources was significant $p<.05$.		grade 7 intentions to drink. Youth in 75th percentile of alcohol marketing exposure had a predicted probability of drinking that was 50% greater than that of youth in the 25th percentile. • Although causal effects are uncertain, policy makers should limit marketing practices that could contribute to drinking in early adolescence. • Concerns directed at TV advertising, findings suggest other kinds of alcohol marketing may also pose risks.

Connolly et al (1994) New Zealand Underage	Longitudinal study	**Study Setting:** Dunedin, NZ. **Sample at Baseline:** 1661 babies born in Dunedin in 1972.	**Study Sample:** Respondents who were present for alcohol interviews at ages 13, 15, and 18 years (n=667). **Outcome Measures:** • Recall of alcohol-related mass media communications • Association between alcohol consumption at age 18 years and measures taken at ages 13 and 15 years • Quantity of beer consumed • Frequency of beer consumption • Wine and spirits consumption **Data analysis:** • Regression analyses (adjusted for other variables in the model). • A 0.05 or smaller probability of rejecting true null hypothesis was used.	• **Quantity of beer consumed by males:** Number of ads recalled by 15-year-old males significantly associated with maximum amount of beer consumed at age 18 years (p = 0.008). As the number of ads recalled increased, maximum amount of beer also increased. The number of ads recalled was also significantly associated with the average beer consumption at the same age (p = 0.047). • **Frequency of beer consumption by males**: No advertising variable significantly associated with frequency of drinking beer. • **Quantity of beer consumed by women**: Recall at age 13 years of alcohol portrayal in entertainment was negatively related to maximum amount of beer consumed by 18-year-old females (p = 0.054). There were no associations between any other alcohol media variables and average amount of beer consumed at age 18 years. Average times spent watching TV at ages 13 and 15 years predicted average amount of beer consumed at age 18 (p = 0.031). • **Frequency of beer consumption by women:** Number of alcohol ads recalled at age 13 negatively associated with frequency of women's beer consumption at age 18 (p = 0.029). • **Wine and spirits consumption:** For both males and females, no media variables (commercial advertising, moderation messages and portrayal of alcohol in entertainment) significantly associated with either amount or frequency of wine and spirit consumption. However, average number of hours spent watching TV was positively associated with females' average amount, maximum amount and frequency of wine consumption (p = 0.028, 0.053 and 0.040, respectively). Those watching more TV when aged 13 and 15 consumed more wine and spirits at age 18. Compared with 13-year-olds, 15-year-olds were more likely to recall ads on TV and radio: 38% and 13% of ads	**Limitations:** • Important to acknowledge exploratory nature of this study. Statistical significance of variables must be viewed within the context of the variables used in the analyses. • Small amounts of variance most likely indicate that, among other things, measures other than those studied also had influence on sample's alcohol consumption. • May not be generalisable to other populations. • Data self-reported **Comments:** • Positive relationship between TV viewing and alcohol consumption when older is consistent with theories that describe the effects of the mass media of normalizing alcohol use and of creating expectancies of the consequences of alcohol use (Gerbner, 1990). • Males rather than females recalled mostly beer promotions, targeted at a male audience. • Negative relationship among women such that smaller quantities of beer were drunk by those who recalled more alcohol portrayal in entertainment material. Beer was drunk less frequently by women who had recalled more beer ads- both media variables measured at age 13 years- was unexpected and difficult to interpret. • By age of 18 years respondents' perception of friends' approval of people who drink was not associated with either quantity or frequency of alcohol consumption (although this association had been measured in same sample at age of 15 years). **Reported conclusions (by authors):** • Increase in recall of commercial alcohol advertising at age 15 years compared with age 13 years. In part this may reflect increased interest in issue at the older age but more likely to reflect significant increase in broadcast media advertising in New Zealand in intervening years. • The increased broadcast advertising was on behalf of beer companies and it is therefore of interest that study found a significant relationship between recall of advertisements and

				recalled by 15-year-olds and 11% and 9% of those recalled by 13-year-olds were said to have been seen on TV and radio, respectively.	the quantity of beer consumed and not quantity of wine and spirits consumed. • Living situation and occupational status were associated with greater alcohol consumption. Alcohol consumption was generally greater for those who had paid work or had been unemployed in the past year as compared with students. Whether men were living at home or with flatmates did not affect their consumption, but women who lived with flatmates tended to drink more beer. • For young New Zealand males, experience of commercial alcohol advertising (in this case predominantly on behalf of beer companies) when younger was related to beer consumption when older. Males who recalled more commercial advertisements at age 15 years reported consuming larger quantities of beer 3 years later.

Dorsett & Dickerson (2004) UK	Correlation Study	**Study Setting:** Data from TNS Consumer's AlcoVision survey* covering three-year period from July 2000-July 2003. *AlcoVision survey designed to record the detailed drinking behaviour of consumers within the UK by 'occasion', at home and within the licensed trade. CAPI-based survey conducted in the street. Interview 20,000 adults (representative of mainland Britain) every year, covering all alcoholic drink markets. **Sample at Baseline:** Not given.	**Study Sample:** Two age groups analysed from survey data: 18-24 year olds and over 25's. **Outcome Measures:** • Economic factors (e.g. average earnings) ▪ Pricing factors ▪ Alcohol promotions and competing categories for consumer spend (i.e. durable and non-durable goods) ▪ Seasonality and weather factors. ▪ Advertising variables (e.g. alcohol TV advertising impacts) **Data analysis:** Two models (one for each age group) estimated using OLS.	**18-24 age group:** key correlates of alcohol consumption are seasonality and economic confidence. On trade-promotions and increasing trend for in-home drinking are also correlates. Also weather dependent – drier weather means an increase in consumption. Hierarchy of size of impact: ▪ Time of year (seasonality) ▪ Awareness of on-trade promotions ▪ Increasing trend towards in-home drinking ▪ Economic confidence ▪ Weather On-trade promotions, increased trend towards in-home drinking and economic confidence are relatively equal in terms of impact on consumption. Advertising not a correlate of overall alcohol consumption among 18-24 year-olds. RTD (ready-to-drink) advertising is not related to alcohol consumption amongst the 18-24 age group. **Over 25 age group:** Seasonality and economic confidence related to alcohol consumption. Pricing issues are most important variables – both the relative prices of competing categories (durables and non-durables) and relative price of alcohol. On-trade promotions are not related to consumption within this market. Hierarchy of size of impact: ▪ Time of year (seasonality) ▪ Pricing and sales of competing categories ▪ Relative price of alcoholic drinks ▪ Economic confidence Alcohol advertising not related to overall consumption in over 25 age group.	**Limitations**: ▪ Covered TV advertising only. ▪ No baseline given. ▪ Alcohol TV impact data only available in an 'under 35' age group, rather than the two age groups of this study. **Comments:** ▪ Aims to determine potential causes of alcohol consumption in the UK and to understand relationship between alcohol advertising and consumption, particularly among younger drinkers. **Reported conclusions (by authors):** ▪ Over past decade been a marked increase in alcohol consumption. Alcohol advertising has increased over same time-frame. In real terms, alcohol advertising expenditure has fallen. This does not suggest a positive relationship between the two. ▪ Review of academic studies and case histories consistently reveals an extremely limited effect of advertising on total market sales, both in FMCG (fast moving consumer goods) in general and in the alcohol sector specifically. These findings are confirmed by econometric analysis of UK annual consumption from 1988 to 2001. This analysis finds no statistical relationship between alcohol advertising and consumption in the UK. ▪ For both 18-24 and over 25 age groups, economic confidence and seasonality are found to be key correlates of consumption. Others factors are dependent on age; consumption among 18-24 year olds is related to on-trade promotions and increasing trend for in-home drinking. Consumption among adults over 25 is related to pricing issues, from both competing categories and the relative price of alcohol. ▪ No statistical relationship between alcohol advertising and consumption was found for either age group. ▪ Ready-to-drink advertising, an area perceived to target younger drinkers, was not found to be a statistically significant correlate of consumption among the 18-24 group.

Duffy (2001) UK	Econometric modelling	**Study Setting** Paper examines empirical performance of four similar systems in the econometric study of a particular set of markets (UK) where advertising effects on product demand are potent	**Data analysis** Structural coefficients for the four damand systems were determined and elasticities of demand calculated from structural coefficients. Composite demand equations for the allocation of expenditure to five broad product groups (alcohol, tobacco, food and soft-drink, clothing and other non-durables). Also investigates Influence of advertising on the total demand for a particular product group. Conditional demand equations for the distribution of expenditure to five groups.	All estimated own-price elasticities are negative. Cross-price elasticities are positive. Quality of estimated effects on prices on demand seems reassuringly high for these models. Over same period, there has been a trend change in consumer tastes involving switch away from traditional purchases (beer) to a new favourite (wine)	The conditional advertising elasticities are generally very small and insignificantly different from zero which suggests that advertising does not have a large role to play in determining the product composition of any given level of total drink demand. Almost all own-advertising elasticities are positive except for spirits. Alcohol advertising elasticities are minute. Therefore, if advertising is to have any effect then there would have a 100% increase in alcoholic drinks advertising which might 'raise' consumption by a mere 2%. Advertising appears to have no discernible effect on total drink consumption.	**Limitations** • Large standard errors are present for alcohol advertising elasticities. **Reported conclusions (by authors).** • Advertising is found to have had had no effect upon the 'product composition' or 'level' of total alcoholic drink consumption in the UK over period from 1964 to 1996. • The consumption of alcoholic drink is affected by relative prices, total consumer budgeted expenditures and, to some extent by autonomous shifts in tests. • The effectiveness of a policy of restraining consumption through taxation is limited by the low price elasticities of demand for the alcoholic beverages. • The fiscal change on consumption is attenuated further, at relatively high levels of taxation, by growing problems of cross-border smuggling and arbitrage as found in the UK, Canada and Sweden.

Fleming et al (2004) USA Underage	Cross-sectional study	**Study Setting:** Residential households in USA in the summer of 1999. **Sample at Baseline:** 608 underaged youth 15-20 and 612 young adults aged 21 to 29.	**Study Sample:** Underage (15-20 yrs): 50.2% female, 49.8% male. Young adults (21-29 yrs): 57.2% female, 42.8% male. **Outcome Measures:** ▪ Dependent variables (attitudes, perceptions, expectancies, underaged youth's intention to drink, young adults' alcohol consumption) ▪ Independent variables (exposure to alcohol advertising) ▪ Demographic & control variables (education, city size, total annual household income, having a close friend or relative who has had alcohol problems, religiosity). **Data analysis:** Regression analyses.	▪ Alcohol ads were influential in shaping young people's attitudes about alcohol advertising messages. ▪ The attitudes and perceptions predicted both positive expectancies and intentions to drink of those under the legal drinking age, but did not affect the young adult's expectancies and consumption. ▪ Positive expectancies were powerful predictors of intentions to drink and consumption for both age groups. ▪ The effects of alcohol advertising on intentions to drink of those aged 15 to 20 years were mediated by cognitive responses to advertising messages and positive expectancies. Mediation effect was not evident among those between 21 and 29 years.	▪ Young people have a greater chance of seeing TV ads for beer than TV ads for liquor when viewing TV in a typical week. Other exposure measures: on weekly basis: ▪ 97.2% of 15-20 yr olds and 95.6% of 21-29 yr olds saw liquor ads in magazines. ▪ 98.2% 15-20 yr olds and 98.5% 21-20 yr olds heard liquor ads on radio. ▪ 58.6% 15-20 yr olds & 62.7% 21-29 yr olds reported seeing outdoor billboards showing liquor products.	**Limitations:** ▪ Single source study. ▪ Did not measure parental modelling as control variable in analyses. ▪ No variable of peer approval of drinking. ▪ Cronbach's alpha values for some of the scales were not sufficiently high (e.g. for positive expectancies about alcohol drinking). ▪ Low internal consistency could be result of using only 3 question items. ▪ Likely that low reliability could influence estimation of standardized regression coefficients. ▪ Comparability to UK questionable ▪ Underage group 15-20 yr olds. **Comments:** ▪ Random sample of households (used random digit dialling methodology). ▪ Findings can be interpreted as a realistic reflection of repeated exposure to alcohol advertising. Did not deliberately choose advertisements with high appeal to young people, nor was data collected at a time of increase in televised alcohol advertising. ▪ Inference of causality enhanced through use of hierarchical multiple regression analyses that took into consideration possible impacts of church attendance, having close friends or relatives that had experienced alcohol-related problems, exposure to alcohol advertising, attitudes and perceptions about alcohol advertising messages, and positive expectancies about drinking on the criterion variables. ▪ Generalisability improved since analyses based on a national and more representative sample than some of the previous research. **Reported conclusions (by authors):** ▪ Exposure to alcohol advertising would have a direct effect on both the 15-20 yr olds and 21-29 yr olds attitudes and perceptions about alcohol advertising messages which in turn would be translated into their

						positive expectancies towards drinking. The positive expectancies would then be postulated to be directly linked to one's intention to drink or actual consumption. The positive responses to alcohol advertising and the information it provides led to positive expectancies about alcohol drinking for the 15-20 yr olds, but not for the 21-29 yr olds. The positive expectancies then significantly predicted the underaged youth's intentions to drink as adults as well as the young adults' consumption of alcohol. Thus, these results provide support for the hypothesized paths of indirect influence from advertising exposure to intentions to drink via positive expectancies for the underaged youth, but do not show such links for young adults. ▪ Having close friends of relatives who have alcohol-related problems was not a factor in predicting 15-20 yr olds desire for drinking.

Gentile, D. A. , Walsh, D. A., Bloomgren, Jr., B.W., Atti, J. A. & Norman, J. A. (2001) USA Underage	Cross-sectional survey, correlation design.	**Setting** Mandatory health classes in Midwestern suburban schools and an Eastern urban school **Sample at baseline** 1588 7th through 12th grade students. Mean age 15.2 (sd = 1.45; range = 12-19). 49% male, 51% female, 90% Caucasian. Response rate greater than 90% in all classrooms.	**Study Sample** 1588 students. Data was collected between September 1999 and May 2000. **Outcome measures** Students completed survey questionnaire on: Salient commercials, TV viewing, perceived parental and peer drinking, perceived parental and peer approval of drinking, attitudes about drinking, intention to drink as adult, current drinking behaviour, awareness of beer brands, brand preference status, usage & loyalty & demographic & background variables. **Data analysis** Correlation analyses were conducted to determine whether the amount of money spent by beer companies to advertise selected beer brands predicts students' responses regarding brand awareness, preference use and loyalty. Regression analyses were conducted to determine the predictors of students' intention to drink beer after they turn 21 & of actual drinking behaviours.	55% have had whole drink of beer, wine or liquor. Average age of 1st drink is 13.4 yrs (sd = 2.2). 31% have had 1 or more whole drink at least once a month during previous year. 43% have engaged in binge drinking. Intention to drink is positively correlated with both sports viewing (r = .21, p<.001 and weekly amount of TV viewing (r =. 19, p<.001). The amount of money spent advertising beer brands in 1998 & 1999 strongly predicts adolescents' brand awareness, preference, use, & loyalty behaviours in 1999-2000. The beer companies that spent the most money on advertising had the highest brand awareness, highest brand preference, highest brand use and highest brand loyalty among adolescents. Correlations for each of these range from 0.63 for brand loyalty to 0.79, the highest correlation being between beer advertising budgets & adolescent drinking. Many types of variables contribute to intentions to drink, including peer variables (10%), parent variables (5%), media-related variables, and attitudinal variables. Media-related variables account for the greatest amount of variance in intention to drink (25%). Predictors investigated accounted for 48% of variance. Many variables contribute to whether students currently drink alcohol as well as their frequency of drinking alcohol, media-related variables (21%) & peer variables (30%) account for the greatest amount of variance predicting actual adolescent drinking behaviour. Predictors investigated accounted for 61% of variance. Average student reported watching 24 hours of TV a week (sd = 15.3). The average (median) student had watched 2 sports programmes all or most of the way through within the past 4 weeks.	**Limitations** • Correlational design so cannot infer causality from results, although results are consistent with causal theories. • Another limitation is the self-report nature of the study. • Convenience sampling method means results not generalisable to other adolescents or other geographic locations. **Comments** • Strength was inclusion of market research advertising tracking methods in addition to traditional psychological approaches for measuring media effects on alcohol related behaviours and attitudes. This permitted clearer, more complete picture of effects of beer advertising on young people. • 90% of sample Caucasian, this % is representative of areas of country from which the students were sampled. • Survey based on those used in previous study. • Survey was pretested with 218 students. • Standard deviations provided where appropriate. • Demonstrates small correlations between advertising exposures and alcohol outcomes. One possible interpretation of this consistent small correlation is that media do not have a large effect on adolescent drinking attitudes & behaviours. However, another possible interpretation is that using gross measures of advertising exposure does not provide enough precision to find a larger effect. **Reported conclusions (by authors).** • Media and advertisement are a significant predictors and perhaps the most significant predictor, of adolescents' (1) knowledge about beer brands, (2) preference for beer brands, (3) current

					drinking behaviours, (4) beer brand loyalty, and (5) intentions to drink. • Most heavily advertised brands of beer in 1998 and 1999 had highest brand awareness, brand preference, brand usage & brand loyalty among junior and senior high school students during 1999-2000 school year. • Results, along with others that demonstrate that children recognise and like beer advertisements, slogans and mascots, indicate that beer advertising is attractive to children and is a major contributor to underage drinking. This realisation should lead beer companies to change their approaches to marketing & advertising.

Henriksen, L., Ferighery, E. C., Schleicher, N. C. & Fortmann, M. D. (2008) USA Underage	Longitudinal study	**Study Setting** 3 middle schools & both high schools in Tracy, California. **Sample at baseline** From 2728 eligible students 1527 who had not initiated alcohol use were identified. 29% lost to follow-up so 1080 students who had follow-up data comprised analysis sample. Gender: 57.3%, girls, 43.7% boys. Age: 10-15 years. Race: 28% non-Hispanic white, 39% Hispanic/Latino, 33% other/unknown.	**Study Sample** 1080 students in grade to 6-8 who had never drank at baseline. **Outcome measures** Drinking status at baseline & 12 month follow-up. Alcohol marketing receptivity classified as high, medium & not receptive. Brand recall Brand recognition. **Data analysis** Logistic regression modelling	Approx 29% of adolescents reported any alcohol use at follow-up; 13% reported drinking at least 1 or 2 days in the last month. Never drinkers who reported high receptivity to alcohol marketing at baseline were 77% more likely to initiate drinking by follow-up than those who were not receptive. Smaller increases in the odds of alcohol use at follow-up were associated with better recall and recognition of alcohol brand names at baseline.	At baseline, 29% of never drinkers owned or wanted to use a alcohol promotional item (high receptivity), 12% named the brand of their favourite alcohol (medium receptivity) & 59% were not receptive to alcohol marketing.	**Limitations** • Large number of students lost to follow-up - 29%. • Group lost to follow-up more likely to be younger, be boys & to report lower grades in schools. Differences mean study may not truly reflect of schools involved. • Conclusions not generalisable to other areas of US with different ethnic/racial compositions or other countries. • Study not designed to explain the underlying mechanism whereby adolescents' receptivity to alcohol marketing promotes drinking. • Relatively young Study Sample meant that the data yielded too little variation to examine drinking frequency & quantity data was not obtained. • Study based on self-report data. **Comments** • Examined influence of alcohol advertising and promotions on the initiations of alcohol use. • A measure of receptivity to alcohol marketing developed from research about tobacco marketing. • Predictive utility of new measure was compared with brand recognition and recall. • Data derived from the Survey of Teen Opinions about Retail Environments (STORE study), a longitudinal study to examine association of adolescents' exposure to retail tobacco marketing & smoking initiation. • Tracy has a similar ethnic/racial composition to state of California & a higher median household income. • Model controlled for multiple risk factors, peer alcohol use, school performance, risk taking & demographics.

						• Group lost to follow-up probably at greater risk for initiating alcohol use, thus findings may underestimate influence of receptivity to alcohol marketing on adolescent drinking. **Reported conclusions (by authors).** • Alcohol advertising & promotions are associated with uptake of drinking. • Prevention programmes may reduce adolescents' receptivity to alcohol marketing by limiting their exposure to alcohol advertisements & promotions & by increasing their scepticism about sponsors' marketing techniques.
Kelly, K. J. & Edwards, R. W. (1998) Country USA Underage	Correlation study	**Study Setting** Schools in 3 communities in north-eastern United States. **Sample at Baseline** 1058 adolescents: 376 7th graders, 376 9th graders & 315 11th graders. Gender: 52% male, 48% female. Data from a few students were not used due to incomplete responses.	**Study Sample** 1,058 adolescents 7th, 9th & 11th graders. **Outcome Measures** Alcohol consumption & intention to consume Advert preference was assessed by short questionnaire for each advery pair viewed. **Data analysis** Statistical analysis was conducted to determine relationships.	Clear upward trend in consumption by grade among the study population, with significant increases from 7th to 9th and 9th to 11th grades. Students in all 3 grades indicated beer was their preferred alcoholic beverage. Ad preference by intent to drink did not reach significance; there was a tendency for adolescents who intended to drink to prefer image advertisements. There were strong gender differences,	Image advertisements were, on average, preferred over product advertisements for all pairs presented.	**Limitations** • Associations do not show causality. • Advertising exposure limited to print media. • Reported drinking behaviours were compared with national figures to determine whether participants were representative. The rates of heavier drinking were higher among 9th and 11th graders in the present sample than in the national sample. This elevation may at least partially be due to the fact that this study was conducted in north-eastern USA, where alcohol use by adolescents is high. **Comments** • Sought to determine if adolescents who drink, or intend to drink alcohol at some future time, find image advertisements for alcohol more appealing than product advertisements. • Questions from American Drug & Alcohol Survey used to assess alcohol actual & intended consumption.

				but grade differences did not reach statistical significance.		Survey widely used & tested with population that include 6th graders to young adults. • Ads used for advert pairs were selected by teenagers in 2 focus groups. **Reported conclusions (by authors)** • 7th, 9th and 11th graders prefer image advertisements for alcohol to product advertisements. More research is needed to determine whether there is a developmental pattern to ad preferences. • Image advertisements more appealing to males and females at all grade levels, with males showing stronger preference than females, particularly among 7th graders. • Association between those who drink, or intend to drink, and preference for image or product ads. • Those who do not yet drink, but think they may in tuture, showed strong image advert preference. Knowledge of cues & imagery that are most appealing to adolescents should be used in development of anti-drinking messages.

Lipsitz et al (1993) USA Underage	Experimental study	**Study Setting:** **Experiment 1:** Three elementary schools in a midwestern metropolitan area. (Two schools located in middle-income suburban neighbourhoods, one in a lower-income inner-city districts. One of the middle-income elementaries was a private Catholic school, the other two schools were public.) **Experiment 2:** Two schools in a midwestern metropolitan area (both in middle-income suburban neighbourhoods – one a public school, one a private Catholic school). **Sample at Baseline:** **Experiment 1:** 92 fifth graders. **Experiment 2:** 74 eighth graders.	**Study Sample:** **Experiment 1:** 43 males and 49 females. Mean age of 10.3 years. Ethnicity: n=87 Caucasian. Six subjects eliminated prior to analysis due to multiple regression (in most cases). Data analyses on remaining 86 subjects. **Experiment 2:** 35 males and 39 females. Mean age = 13.5. Ethnicity = 97.3% Caucasian. Three subjects eliminated from analysis as had prior knowledge of the study. Data analysis on remaining 71 subjects. **Outcome Measures:** For both experiments: • Alcohol Expectancy Questionnaire-Adolescent form (AEQ-A). • Memory test (to measure recall of advertisements (alcohol and others). **Data analysis:** SAS statistical package.	None	• **Experiment 1:** • Average score on memory test was 26.5 out of 32, suggesting high degree of attentiveness to the stimuli. • Mean scores on the AEQ-A scales indicated that the fifth graders generally had very negative expectancies about alcohol. • **Experiment 2:** • On memory test, mean score = 27.9 out of 32, once again indicating a high degree of attention to videos. • AEQ-A scores: significant main effect for sex, $F = 5.37$, $p < .02$, as females had more negative expectancies for alcohol ($M = 22.1$) than males did ($M = 20.9$). However, responses in general showed little variation ($SD = 2.4$). • **Comparison** (analysis of 40 fifth grades and 40 eighth graders matched by socioeconomic status and location)**:** In all cases, eighth graders had more positive alcohol expectancies than fifth graders did.	**Limitations:** • Unclear why video manipulation failed to produce results: some possible explanations include artificiality of setting, simplicity of design, selection of AEQ-A as a dependent measure. • There is some doubt about the generalizability of this study. **Comments:** Another possible explanation for video manipulation failing to produce results is that alcohol advertising simply does not affect alcohol expectancies. Perhaps null findings mirror reality of TV ads having no impact or relatively minimal impact on youngsters' feelings about alcohol. To date there is no *strong* evidence to the contrary, survey studies have found only small correlations with ambiguous interpretations, and experimental studies have found no results or results that were non robust. **Reported conclusions (by authors):** • Neither exposure to beer commercials nor exposure to antidrinking messages affected alcohol expectancies. • In both fifth grade and eighth grade studies there was no significant effect for the video manipulation on any of the seven AEQ-Q scales. • In eighth grade study, there was one significant sex effect, as females were more likely than males to see alcohol as impairing cognitive and motor abilities.

McCreanor et al (2005) New Zealand	Qualitative study	**Study Setting:** Young people in Auckland recruited from community networks of research team. Data recorded "since early 2003" (paper received Sept. 2005). **Sample at Baseline:** "…more than 250 young men and women aged between 14 and 18 years…"	**Study Sample:** Focus groups from event-related (e.g. social events such as concerts, parties, school balls etc.) and affinity-group (e.g. groups of 3-5 friends matched by age, ethnicity and gender) sessions. Sample included both indigenous Maori and settler non-Maori settler peoples, usually of European descent. **Outcome Measures:** ▪ Engagement (ability to recognise, discuss, debate and elaborate – with meanings round alcohol marketing). ▪ Identification ▪ Consuming identities (of alcohol marketing) **Data analysis:** Describes series of themes running through participants' talk on the topic of alcohol.	**Engagement:** ▪ Many participants commented on specific advertisements and campaigns that demonstrate both awareness of the product and a reflexive understanding of the milieu. ▪ Multiple ways in which different ad campaigns (Tui, Export, Steinlager, Export Gold in the example given) merge and morph in relation to each other suggests an overall effect of congruence rather than dissonance in terms of the ways in which the participants engage with the marketing and with any one of these brands. ▪ Overall participants actively engaged with marketing materials and often articulated sophisticated understandings of youth cultures that explained the interweaving of social and symbolic aspects of markets with youth identities. **Identification:** ▪ Participants very aware of importance and power of consumption in young people's lives, arguing that engagement in buying and possessing provides salient and interesting markers to signal identity, status and belonging. ▪ Overall, participants demonstrate identification with marketing and brands at both social and personal levels, understand themselves to be targets of campaigns, and value knowledge and scenarios from specific advertisements as accurate representations of youth interests and cultures. ▪ Some participants' analyses work critically and reflexively with alcohol marketing in particular highlighting the targeting of young people through a range of approaches and content. **Consuming Identities:** ▪ Engagement and identification enable personification of branded products and uptake of such alcohol identities. ▪ Participants demonstrate varied ways in which alcohol identities are taken up and made use of in personal and social settings. These include playful use of identity positions and unwanted attributions of others.	**Limitations:** ▪ Convenience sample. ▪ Baseline sample not clear. ▪ Limited detail on methods. ▪ Timeframe not clearly defined. **Comments:** ▪ National alcohol surveys in NZ have shown increased youth consumption with young people drinking more frequently, increasing quantities they drink on a typical drinking occasion, increasing their number of heavier drinking occasions. ▪ Focus groups were open-ended interviews about social life guided by means of a broad interview guide that included a number of leads toward discussing alcohol marketing, including: ▪ What events have you been to lately? ▪ What is cool? ▪ What are your favourite ads? ▪ If you were a drink, what would you be? ▪ What do you do in the weekends? **Reported conclusions (by authors):** ▪ Findings are highly congruent with strong international evidence of over-exposure of young people particularly in youth-orientated media. Familiarity and level of comfort with alcohol brands demonstrate that success of these marketing styles is strongly contributing to this goal.

Nelson & Moran (1995) USA	Empirical study	**Study Setting:** USA consumption and advertising data.	**Study Sample:** Annual USA data for 1964-1990 on beverage consumption, prices, expenditures, and real advertising. **Outcome Measures:** Conditional demand for US alcoholic beverages. Advertising and conditional demand by beverage. Advertising and composite demand for ethanol. **Data analysis:** Four differential demand models.	• In all four models, advertising coefficients for wine are positive and statistically significant. Additionally, wine advertising has statistically negative effect on spirits demand, while spirits advertising has statistically negative effect on wine demand. • Advertising elasticities are small in magnitude, 0.1 or less in absolute value. This indicates that advertising does not have a very strong effect on alcohol demand at the beverage level. E.g. 1% increase in the growth of real advertising of wine increases consumption of wine by only 0.1% and reduces spirits consumption by only 0.03%. Thus, results support the FTC's (Federal Trade Commission) view of alcohol advertising: that is, while advertising of alcoholic beverages may influence choice of brand, there is very little impact on beverage demand.	**Limitations:** No specific limitations found. **Comments:** • Supports general view advertising has little impact (at the margin) on demand for beverages, and instead serves to alter brand shares. Further, beer demand is always independent of advertising of other beverages. Confirms earlier results obtained for UK by Duffy (1987, 1990) and Selvanathan (1989a). For USA, results for beer demand obtained by Lee and Tremblay (1992) also strongly supported. **Reported conclusions (by authors):** Alcohol advertising has no effect on consumption of total ethanol and very small effects on consumption of individual beverages.

Ofcom (2005) UK Underage	Qualitative & quantitative research. Qualitative – 16 discussions groups across the UK. Quantitative – Interviews. Additionally, Ofcom conducted analysis to look at changes in advertising trends based on Nielsen Media data.	**Study Setting** UK **Sample at Baseline** Representative sample of 1539 young people aged 11-21 across the UK.	**Study Sample** 11-21 year olds across the UK. **Outcome Measures** Likeability of advert. Advert appeal – if advert stood out as different from other adverts, if advert was aimed at young people, if advert would encourage people to drink. **Data analysis** Statistical analysis was conducted.	67% of 11 to 13 years say they have tried alcohol although most only once or twice or on special occasions. 9% of 11 to 13 year olds claim they are regular or occasional drinkers. The prevalence of drinking increases with age.	The elements that young people like in adverts that came up consistently across the groups included humour, music, originality, the unexpected & people having fun or behaving in a childish fashion. The most liked advert rated lowest on 'encourages people to drink' indicating clearly that likeability does not automatically translate into persuasion. However, the adverts for the brands ranked in 2nd & 3rd position on likeability are the strongest rated executions for encouraging drinking. Young people's selection of advert order likeability & 'encourages people to drink' were almost identical. The majority of adverts were thought to be targeted at young people by at least 4 out of 10 young people.	**Limitations** • Adverts used were not a random selection & as scope determines are not representative of all adverts in the category. Adverts were selected on how appealing adverts were thought to be to young people, how appealing actual products were thought to be to young people & if adverts covered the issues/themes which had been highlighted in the revised code. **Comments** • Research predates changes to Advertising Standards Code. Study reports findings of benchmarking wave of qualitative & quantitative research investigating appeal of selection of alcohol adverts to 11-21 year olds. The post wave study, discussed below (Ofcom, 2007), reports on impact that code changes have had on appeal of adverts to people under age of 18. • Research objectives for the benchmark stage were to explore: ○ young people's relationship with drinking & alcohol ○ what drives positive & negative appeal of advertising amongst young people ○ what drives positive & negative appeal of 'alcohol advertising' amongst young people ○ the extent to which a selection of alcohol adverts appeal to people under 18 years of age. • Strength was that quotas were set to ensure a representative sample of 11-21 year olds in UK. Quotas were set on age and gender, school/employment status & location. • Research groups were held across the UK in mixture of urban, deprived & rural locations. • At the analysis stage the data was weighted to ensure that the final sample was representative of

						the UK. **Reported conclusions (by authors).** • Likeability of an advert does not guarantee likeability of product/brand. Likeability & advertising appeal can be purely driven from a response to creative execution & this will not necessarily translate to brand. • Reinforces difficulties in assessing appeal of alcohol advertising amongst those under 18 years of age. Every advert may work in a different way; context of the brand and product may contribute to particular response to advert as well as executional details.

Ofcom (2007) UK Under age drinkers	**Design** Qualitative & quantitative research. Qualitative – 11 discussions groups across the UK. Quantitative – Interviews. Additionally, Ofcom conducted analysis to look at changes in advertising trends based on Nielsen Media data.	**Study Setting** UK **Sample at Baseline** Representative sample of 1,514 young people aged 11-21 across the UK.	**Study Sample** 11-21 year olds across the UK. **Outcome Measures** Recall of advertising, likeability, whether young people thought adverts were aimed at them, if commercial made drink look appealing & if it would encourage people to drink. Changes in advertising trends based on Nielsen Media data. **Data analysis** Statistical analysis was conducted.	Proportion of 11-13 years who had never drunk alcohol has increased from 31% in 2005 to 46% in 2007. Alcopops have declined in popularity. There has been an increase in the amount of cider young people report drinking.	Recall in alcohol advertising declined between 2 waves of research. Significant decline in average number of unprompted mention of alcohol adverts from 3.95 to 3.31. From 2005 -7 there was a decline in recall of beer (76% to 69%), alcopops (50% to 42%), vodka (20% to 16%) & spirits (17% to 7%) advertising & increase in recall of cider (6% to 19%) advertising. With the exception of vodka the downward shift in TV advertising spend was matched by a downward shift in advertising recall. For cider increase in spend was matched by increase in recall. Most changes in recall are mirrored by change in advertising spend. The likeability of adverts has remained almost exactly the same between the 2 waves of research Young people are less likely to feel that the adverts are aimed at them (net agreement score has fallen from 7% to -13%). However, young people are more likely to say that the adverts make the drink look appealing (net agreement score has increased from 25% to -34%) & they will encourage people to drink (net agreement score has increased from 24% to 28%.).	**Limitations** • Due to multi-faceted relationship between young people & alcohol, is limited in understanding impact of regulatory changes. • Alcohol advertising market, when post wave research was conducted, is different to that researched in the pre wave (2005). There is now considerably less exposure to alcohol advertising on TV amongst young people in 2007 compared with 2005 & types of products being advertised are markedly different – so the pre & post wave studies are not directly comparable. • Changes in alcohol advertising market & cultural changes which have taken place between this and the earlier study cannot be conclusively attributed to changes in the advertising code. • Adverts used were not a random selection & as are not representative of all adverts in the category. Adverts were selected on how appealing adverts they were thought to be to young people & how appealing the actual products were thought to be to young people. **Comments** • Measures extent to which changes to alcohol advertising rules made in 2005 may have impacted on appeal of selection of alcohol advertisements to people under age of 18. The baseline report (Ofcom, 2005) is discussed above • Specifically deals with Advertising Standards Code changes to TV advertising of alcohol. • Strength was that random location sampling technique used to ensure a representative sample of 11-21 year olds in UK. Quotas were set on age and gender & for those over 16 on working status. • At the analysis stage, data weighted to ensure that final sample was representative of UK. **Reported conclusions (by authors).**

						• In 2005 when Advertising Code changes were introduced if was felt necessary to provide a benchmark by which the appeal of future commercials would be measured. • Considerable market and cultural changes since introduction of code changes in 2005 & between the 2 waves of research mean that the 2 waves are not directly comparable and it would be difficult to untangle impact of these changes on young people's attitudes & behaviour towards both alcohol & alcohol advertising. • Alcohol advertising market has changed significantly, particularly with regards to TV advertising. TV alcohol advertising spend has declined & young people are exposed to less TV advertising for alcohol products. • The recall of alcohol advertising has declined since 2005 & is most probably linked to this decline in advertising spend. • There has been no change in how many young people say they like the adverts but there has been an increase in those saying the adverts make the drinks look appealing & would encourage people to drink it. • Importantly, however, given objectives of the Advertising Code changes, there has been a decline in the proportion of young people saying they feel commercials are aimed at them.

Pasch, K. E., Kpmro, K., Perry, C. L., Hearst, M.O. & Farbakhsh, K. (2007) **USA** **Underage**	Longitudinal study	**Study Setting:** Chicago Schools **Sample at Baseline:** 4137 students were eligible for study; analysis sample was 2746 students with complete data at end of both 6th & 8th grade. 2,586 sixth-grade students in 2002-2003 school year. Ethnicity - 37% black, 33% Hispanic, and 15% white. Gender was evenly distributed Average age 12.2 at end of sixth grade. Surveys administered in 6th, 7th & 8th grades. For this analysis using 6th grade data as corresponds with advertisement measurement & 8th grade was final follow-up survey.	**Study Sample:** 2,586 sixth-grade students in 2002-2003 school year. 61 schools, 2 had split sites so 63 school sites. **Outcome Measures:** All outdoor alcohol advertisements within 1,500 feet of 63 Chicago school sites were documented and coded for content and theme April – May 2003. Alcohol use Alcohol intentions Alcohol norms Alcohol attitudes Exposure to other types of alcohol advertising Awareness of outdoor alcohol advertising. **Data analysis:** Longitudinal mixed-effects regression analysis to determine association between number of alcohol advertisements around a school in sixth grade and student alcohol behaviours, intentions, norms, and attitudes at end of eighth grade.	**Exposure to alcohol advertising around schools at end of sixth grade predicted alcohol intentions at end of eighth grade. True even for students who were nonusers of alcohol in sixth grade.**	931 alcohol advertisements found within 1,500 feet of 63 school sites. On average each school site had 14.8 advertisements with range from 0 (n=22) to 109 (n=1). There were 41 youth-orientated advertisements located around 19 schools (n=0 to n=6), 19 (46.6%) were for beer, 21 (51.2%) for distilled spirits & 1 (2.5%) for alcopops.	**Limitations:** • Part of RCT of alcohol-use prevention, it is not clear at what stage students receive intervention but if they have received intervention before this longitudinal study it could have impacted on results. • Results may not be generalisable to other populations with different ethnic mixes or different geographic locations. • Analysis sample differed from full sample on mean levels of alcohol behaviours & intentions at the end of 6th grade, with higher levels reported in full sample. • Full sample was older & had more males than analysis sample which could have impacted on the results. • No statistically significant association found between exposure to outdoor advertising & alcohol behaviour subscale. • Findings for alcohol behaviours and intentions scale appear to be driven by influence of advertising on alcohol intentions. This may be, in part, attributable to fact that prevalence of alcohol behaviours at end 8th grade was relatively low in our sample. The mean of the alcohol behaviour subscale was 6-.7, range 5-33, possibly leading to lack of power to detect an association between alcohol advertising exposure & alcohol behaviour. • Small sample size, high loss to attrition. **Comments:** • Objectives were to (1) document and describe all outdoor advertisements surrounding schools and (2) to examine association between exposure to alcohol advertising in 6th grade & youth alcohol use, intentions, norms, & attitudes in 8th grade. • No previous study has documented all alcohol advertising in areas near school. • Additionally, no study has examined the

						longitudinal association between exposure to outdoor advertising near schools and alcohol use among adolescents. • To ensure the validity of the designations of the advertisements as youth orientate, focus groups were conducted with youth in 2 intervention pilot schools. • Particular strength, which supports the validity of findings, is longitudinal design. **Reported conclusions (by authors):** • Exposure to outdoor alcohol advertising around schools is associated with subsequent youth intentions to use alcohol. • Association found even among 6th grade nonusers of alcohol, suggesting than even those who have not used alcohol are still influenced by alcohol advertising. • Restrictions in alcohol advertising near schools may be warranted.

Robinson et al (1998) USA Underage	Prospective cohort study	**Study Setting:** Six public high schools in San Jose, California **Sample at Baseline:** Of 3194 ninth-grade students, 2777 were eligible to participate. A total of 2609 eligible students (94.0%) participated in baseline assessment.	**Study Sample:** Of participating students at baseline, 1583 (61.0%) also participated in follow-up assessments 18 months later. 75 students excluded from analysis because of inconsistent responses on reports of alcohol use. Analysis include 1533 students; mean age = 14.6 years. **Outcome Measures:** Students reported hours of TV, music video, and videotape viewing; computer and video game use; and lifetime and past 30 days' alcohol use at baseline and 18 months later. **Data analysis:** Associations between baseline media exposure and subsequent alcohol use were examined with multiple logistic regression.	During the 18-month follow-up, 36.2% of baseline nondrinkers began drinking and 50.7% of baseline drinkers continued to drink. Onset of drinking was significantly associated with baseline hours of TV viewing (odds ratio [OR] = 1.09; 95% confidence interval [95% CI] = 1.01-1.18), music video viewing (OR = 1.31; 95% CI = 1.17-1.47), and videotape viewing (OR = 0.89; 95% CI = 0.79-0.99), controlling for age, sex, ethnicity, and other media use. Computer and video game use was not significantly associated with the subsequent onset of drinking. Among baseline drinkers, there were no significant associations between baseline media use and maintenance of drinking.	**Limitations:** • Study involved students from six public high schools in a single urban area. • Students not attending school, not eligible, or lost to follow-up are not included in the sample. • Although sample was ethnically and socioeconomically diverse, generalization of results beyond study population is always cautioned. • It is possible for attrition to introduce biases. As is typical in school-based samples, dropouts tended to represent a higher-risk group than did students remaining in the sample. However, losing these high-risk adolescents from the sample would be expected to reduce the magnitude of the associations between media exposure and alcohol use, not exaggerate them. • Data limited to self-reports and cannot rule out possibility that measurement error influenced results. • Study did not assess other established risk factors for alcohol use or the specific media content to which adolescents were exposed. **Comments:** • Strength of association between TV and music video exposures and subsequent onset of alcohol use was found to be quite large. One extra hour of TV viewing per day was associated with an average 9% increase in risk of starting to drink over next 18 months. Similarly, 1 extra hour of music video viewing per day was associated with an average 31% increase in risk of starting to drink over next 18 months. • Results consistent with previous research. • Alternative explanation is that higher-risk adolescents – those predisposed to become future

					drinkers – are also those who are more attracted to TV and music videos. Music video viewing was cross-sectionally associated with an index of multiple risky behaviors, including alcohol use, in a large sample of adolescents in Southeastern USA). • This may be explain inverse associations between VCR video viewing and onset of alcohol use. Spending more time watching videos in a VCR, to some extent, may be a proxy for generally low-risk adolescents. However, this explanation is not consistent with the finding that greater TV and music video viewing is associated with initial onset of alcohol use but not with continued use. • To maximize validity of self-reports, used well-established, previously validated measures of alcohol use, and made extensive efforts to assure confidentiality. **Reported conclusions (by authors):** • TV and music video viewing are independent risk factors for the onset of alcohol use in adolescents. In contrast, adolescents who spend more time watching videos in a VCR are at lower risk of starting to drink alcohol. In addition media use appears to influence onset of drinking but not continued alcohol use. • Although causal inferences cannot be drawn from nonexperimental study, several criteria have been suggested to help judge whether epidemiologic risk factor may be causally related to a specific outcome. They include temporal sequence, strength of the association, exposure response, specificity, consistency, experimental evidence, and plausibility and coherence. • Exposure to portrayals and promotion of alcohol use in the media may be causally linked to the onset of adolescent drinking.

Saffer, H. (1997) USA	Design Econometric study	**Study Setting** Metropolitan areas in USA. **Sample at Baseline** Quarterly observations from 1986 to 1989 for top 75 ADIs in USA, includes 1200 observations.	**Study Sample** 1200 observations **Outcome Measures** Total fatalities rate – motor vehicle fatalities for all occupants, divided by population. For all ages & 18-20. Advertising - sum of alcohol advertising for spot TV, spot radio, & outdoor advertising messages. **Data analysis** Regression modelling.	Effect of ban on only broadcast alcohol advertising in the range of 2000 to 3000 lives saved per year. This takes into account the fact that ban on broadcast media would result in considerable substitution to other media. Elimination of alcohol advertising as a cost that reduces taxable corporate income is another policy option. This would raise cost of advertising by about 54%, which would reduce fatalities by about 1300 per year. Elimination of tax deductibility of alcohol advertising would raise about $300 dollar / year in new revenue.	**Limitations** • Caution required when interpreting findings for countries other than USA. USA has different alcohol consumption patterns, rates of motor vehicle fatalities and different amount of advertising spend to other countries meaning results might not be applicable. **Comments** • Estimates empirically effect of alcohol advertising on motor vehicle fatalities. • First study to measure effect of advertising directly on motor vehicle fatalities; all previous studies examined effects on alcohol consumption. • Uses market-specific price of advertising. This variable is important in the treatment of simultaneity bias & in estimating price elasticity of alcohol advertising. • Uses metropolitan areas as unit of observation. Almost all prior studies have used national aggregates. Use of metropolitan areas adds an important cross-sectional variance to data. It also increases number of observations in data set to more conventionally acceptable level than data sets from previous studies. • Unit of observation in this data set is an aggregation of counties know as an area of dominant influence (ADI). The Arbiton Company (1990) has defined ADI for all TV markets in USA. The ADI is similar to but somewhat larger than a metropolitan statistical area. • The 75 included TV markets account for more than 75% of population. • Motor vehicle fatalities are the best empirical measure of drunk driving available. Whilst not

					all motor fatalities are result of drink driving, there is strong correlation between 2 measures. • 5 independent variables are included in 4 regression: real per-capita personal income, median year of schooling, unemployment rate, percent Afro-American & percent Hispanic. **Reported conclusions (by authors).** • Alcohol advertising is contributing factor in high level of motor vehicle fatalities in USA. • While advertising is significant it is less important than alcohol price as determinant of motor vehicle fatalities. • If ban on broadcast alcohol advertising did not also include bans on other alcohol marketing effect on motor vehicle fatalities might be in range of 2000-3000 lives saved per year. • Elimination of the tax deductibility of alcohol advertising could reduce alcohol advertising by about 15%, reduce motor vehicle fatalities by about 1300 death per year & raise about $300 million a year in new revenue.

Saffer, H. & Dave, D. 2006 USA Underage Binge Drinkers	Longitudinal study	**Setting** Uses data from monitoring the Future (MTF) and National Longitudinal Survey of Youth 1997 (NLSY97) and looks at effect of reduction in alcohol advertising. **Baseline sample**	**Study Sample** Special version of MTF data that merged advertising & price was made available to study. Merged data set contained only a limited set of individual-specific variables. MTF data are a pool of 1996 and 1998 cross-section of 8th, 10th & 12th graders. This pool is a nationally representative sample of over 63000 high school students. Pooling of the 1996 & 1998 surveys provides sufficient samples for separate analyses of the effects of price & advertising by race & gender. Pooling these 2 years also provides additional time variance, especially in the alcohol advertising & price measures. NLSY97- sample consists of approx 10000 youths were 12-16 as of 31/12/1996. NLSY97 is representative of adolescents nationwide and provides important alternative to MTF by including individuals not in school & data from parents. Advertising data obtained from Competitive Media Reporting (CMR) which collects advertising data in	Price and advertising effects are generally larger for females relative to males. Controls for individual heterogeneity yield larger advertising effects, implying that the MTF results may understate the effects of alcohol advertising. Results from the NLSY97 suggest that a 28% reduction in alcohol advertising would reduce adolescent monthly alcohol participation from 25% to between 24 and 21%. For binge participation, the reduction would be from 12% to between 11 and 8%. The past month price participation elasticity is estimated at -0.26.	**Limitations** • Used self-report data for alcohol consumption. • Findings relevant to USA population but may not be generalisable to other population or geographic locations. • Focused on participation only as easier for respondent to measure if drank compared to how much. • Data analysed is for adolescents 10 years ago who could be significantly different to today's adolescents. • Data set used is limited to 75 largest cities in USA. **Comments** • Large sample of MTF allows estimation of race & gender specific models. • Longitudinal nature of the NLSY97 allows controls for unobserved heterogeneity with state-level & individual fixed effects. • The past month price-participation elasticity is estimated at -0.26, consistent with prior studies. • Reliability of CMR data is widely recognised in the advertising industry. All of the data reported are independent estimates & do not use any info from alcohol producers. • Weighted means are provide for MTF & NLSY97 for all relevant variables. **Reported conclusions (by authors).** • Reduction of alcohol advertising can produce a modest decline in adolescent alcohol consumption, though effects may vary by race and gender. • Complete elimination of all alcohol advertising with restriction on additional expenditures on other marketing techniques, or the elimination of all forms of alcohol marketing, would undoubtedly result in further decreases in monthly alcohol

			broadcast, outdoor & other media. **Outcome measures** Alcohol price Alcohol advertising Income Alcohol consumption. **Data analysis** Production of empirical models that estimate differential effects of alcohol price & advertising by gender & race.		participation & binge participation among adolescents.

Sargent et al (2006) USA Underage	Longitudinal study	**Study Setting:** 15 New Hampshire and Vermont middle schools over two-year period. **Sample at Baseline:** N=4,665	**Study Sample:** Adolescents aged 10-14 years (N=4,665). Fifth graders (10-11 years old) (8.3%) Sixth graders (11-12 years old) (25.7%) Seventh graders (12-13 years old)(31.5%) Eighth graders (13-14 years old) (34.4%) Sample was equally distributed by gender and was mostly white, consistent with the population of New England. Majority of sample (78%) reported that both parents had graduated from high school. Longitudinal follow-up of never drinkers (N=2,406). **Outcome Measures:** Prevalent drinking (exposure measurement = exposure to movie alcohol use). **Data analysis:** • Attrition analysis, using logistic regression to compare baseline characteristics for adolescents who were retained in the longitudinal sample versus those lost to follow-up.	• Covariates showing a strong and significant association with early-onset alcohol use in both samples included higher age, lower school performance and self-esteem, higher rebelliousness and sensation seeking, and smoking initiation. • For the cross-sectional sample, there is a strong direct linear association between exposure to movie alcohol use and prevalence of early alcohol use, from zero prevalence at zero exposure to a prevalence of almost 0.6 when exposure reached the 95th percentile, or about 23 hours. • For the longitudinal sample, also a linear association between initial movie exposure and onset of alcohol use, from zero incidence at zero exposure to an incidence of 0.2 when exposure reached 11 hours (the 65th percentile for exposure at baseline). • For most of the cross-sectional sample, drinking increases steadily as movie exposure increases, but association between movie exposure and drinking decreases somewhat at a high level of exposure.	• For both the cross-sectional and longitudinal samples, exposure to alcohol use was significantly higher in older adolescents, in males, and in those with lower parent education, poorer school performance, lower levels of self-esteem, lower maternal support (responsiveness), lower maternal control (demandingness), and higher levels of rebellious and sensation seeking. • Adolescents who smoked also had substantially higher exposure to movie alcohol use.	**Limitations:** • Interpretations are speculative because there are other possible mediators of media effects. • Sample of youth came from one geographic area and was predominantly white. Extension of findings to samples of adolescents from other areas of United States would be useful for testing generality of results. • Measures of alcohol use were relatively simple ones (survey question: "Have you ever had beer, wine, or other drink with alcohol that your parents didn't know about?) • Study, although longitudinal, did not examine transitions to heavy drinking or alcohol abuse. • Examined exposure to only one type of entertainment media. Cannot comment on how much overlap there is between exposure to movie alcohol use, much of which is viewed on TV or DVD, and exposure to alcohol use in TV through programming or advertisements. **Comments:** Sample of 601 popular contemporary movies. **Reported conclusions (by authors):** • Popular movies contain substantial amount of alcohol use, particularly among R-rated movies (No Children 17 or Under Without Parent or Guardian admitted) but appreciable even in movies with the ratings of PG and PG-13 (Parents Strongly Cautioned - Some material may be inappropriate for children under 13 years old). Overall exposure to movie alcohol use is common in general population of adolescents with half of population exposed to 8 or more hours, a level that does not seem trivial in absolute terms. • Movie exposure was related to a significantly higher likelihood of early-onset alcohol use • Effect observed across the age range studied, fifth

			• Side-by-side analysis of the relation between exposure to movie alcohol use and early-onset drinking first without and then with all covariates for cross-sectional (prevalence) and longitudinal (incidence) samples using multilevel logistic regression to control for potential correlation due to nesting of students within schools (random school-level intercept). Assessed fit of linear logistic regression graphically by comparison with a generalized addictive model. Nonparametric regression appropriate for dichotomous outcomes. Results were judged significant if $p < .05$ in a two-sided test.	• For longitudinal sample, estimates for linear and quadratic effects of movie alcohol exposure at baseline were weaker and stronger, respectively, but the linear effect remained statistically significant. • Other variables with significant partial associations with early-onset drinking in both samples were age and ever tried smoking a cigarette. Gender was not associated with prevalent use, but females were at somewhat higher risk for incident use of alcohol. Of the personality and parenting variables, only rebelliousness and sensation seeking retained statistically significant associations with drinking in both cross-sectional and longitudinal samples. For rebelliousness, both linear (positive) and quadratic (negative) effects were significant, but for sensation seeking, linear effect was significant in both samples (positive), but the quadratic effect (negative) was significant only in the longitudinal sample.		grade through eighth grade at baseline. • Effect of movie exposure on alcohol onset remained significant after controlling for a range of demographic characteristics including participant gender, grade, and parental education. • Effect of movie exposure also remained significant in regression models that included covariates that are predictors of longitudinal attrition and also plausible confounders of media exposure effects, including youth's personality characteristics, adoption of other risky behaviours, and his/her relationship with parents. • Results demonstrate prospective effect of movie alcohol exposure on drinking initiation, and that effect of movie exposure remained significant with inclusion of multiple control variables works against confounding. • Although effect is seen throughout population (linear term), it appears that it is stronger among adolescents in lower exposure categories. These results may suggest that the movie effect is most important for teens at lower overall risk for experimentation with alcohol and is not quite as influential for more deviance-prone teens.

Snyder, L.B., Milici, F. F., Slater, M., Sun, H. & Strizhakova, Y. (2006) USA Underage Binge Drinkers	Longitudinal study (telephone survey)	**Setting** Household in 24 USA Nielsen media markets, April 1999 to Feb 2001. **Baseline sample** Individuals aged 15 to 26. Baseline refusal rate was 24%. Sample sizes per wave were 1872, 1173, 787 and 588	**Study Sample** Individuals were randomly sampled within households within media markets. Markets were systematically selected from top 75 media markets representing 79% of USA population. Individuals interviewed on 4 occasions. **Outcome measures** Self-reported number of alcoholic drinks consumed in the prior month. Self-reported alcohol advertising exposure in the prior month. Market alcohol advertising expenditures per capita **Data analysis** Used multilevel modelling to handle the complex sample and repeated measure design. Software used was HLM 6.01.	**Baseline** 61% had had at least 1 drink. Drinkers consumed 38.5 total drinks on average in he past month (95% CI, 34.3-42.7) drinking 4.5 drinks per episode (95% CI, 4.3 - 4.8). Drinkers younger than 21 had 29 drinks on average with 4.5 drinks on averaged each drinking session (95% CI, 4.1 – 4.8). Youth who saw more alcohol advertisements drank more (each additional advertisement seen increased the number of drinks consumed by 1% [event rate ration, 1.01; 95% CI, 1.01-1.02]. Youth in markets with greater alcohol advertising expenditures drank more (each additional dollar spent per capita raised the number of drinks consumed by 3% [event rate ratio, 1.03; 95% CI, 1.01-1.05]. Examining only youth younger than the legal drinking age (21), alcohol advertisement exposure and expenditures still related to drinking. Youth in markets with more alcohol ads showed increase in drinking levels into their late 20, but drinking plateaued in the early 20s for youths in markets with fewer ads.	**Baseline** Individuals reported seeing an average of 22.7 alcohol ads per month.	**Limitations** • Standard survey sampling techniques were used selecting youth in household with most recent birthday. • Compared with youth who remained in the sample, youth who dropped out by the 4th interview were slightly older, less likely to have been in high school, less likely to have been living at home & drank more alcohol as of baseline, this could have dramatically impacted on the results. • High attrition. • Self-report data. • Industry data was used to measure advertising exposure, which largely reflects most expensive medium for advertising TV. During this period, data on outdoor advertising was spotty and may have been incomplete in some markets. • Other forms of marketing (such as product placement, stadium advertising) were not considered. • Study did not control for effects of parent and peer influences on drinking. Two letters of comment raise important limitations: Schultz (2006): - study based on behaviourist model which has been challenged for years. - correlations do not mean causality. - massive attrition rate. - tenuous links between expenditure/exposure/consumer behaviour. - four-week respondent recall invites speculation & guessing. Smart (2006): - serious limitations in planning & execution. - refers to youth sample but 50% 21 and over. - Two thirds of sample not followed up through the

						four interview periods. - Analyses limited to demographic & advertising variables. - Study claims that more advertising leads to more drinking. However, table 2 shows that those who saw the most advertising decreased their drinking. - biased 1-sided view of alcohol advertising effects. - reliability and validity of the measure has not been assessed. - major problems with attrition. - anomalies appear in the alcohol consumption data. **Comments** • Tests whether alcohol advertising expenditures and the degree of exposure to alcohol advertising affects alcohol consumption by youth. • Control variables included age, gender, ethnicity, high school or college enrolment and alcohol sales. • Selected 24 media markets were not significantly different from the markets not selected on any of the measured criteria. • Strengths were use of objective measure of advertising expenditure to complement the subjective measure of advertising exposure and matching of expenditure data with individual behaviour. **Reported conclusions (by authors).** • Alcohol advertising contributes to increased drinking among youth. • Further research could examine impact of different forms of advertising & consumption of various alcoholic products.

Stacy et al (2004) USA Underage	Observational Study	**Study Setting:** Adolescent public school students in middle school in Los Angeles area in Spring 2000. **Sample at Baseline:** 2998 seventh-grade students in 20 middle schools. Average of 12.5 years old at baseline.	**Study Sample:** Schools selected randomly from a list of all public schools in Los Angeles County. All seventh-grade students invited to participate (fewer than 3% of the students or their parent declined). One year later, students invited to participate in follow-up survey; 2250 (75%) participated – these students compose the analytic sample. Gender: 51% female Ethnicity: 55% Hispanic, 19% Asian, 14% non-Hispanic white, 2% African-American, 1% Pacific Islander, 1% Native American, 5% mulit-ethnic, 3% did not report ethnic background. **Outcome Measures:** ▪ **Measures of advertising exposure** (watched TV shows index, watched TV sports index, self-reported frequency, cued-recall memory test, draw-an event memory test) ▪ **Measures of alcohol use** (current alcohol use,	Beer 7th grade: Never used: 1259 (55%) Used but not in past month: 640 (28%) Used in past month: 351 (16%) Beer 8th grade: Never used: 1070 (48%) Used but not in past month: 772 (34%) Used in past month: 408 (18%) Wine/Liquor 7th grade: Never used: 1427 (63%) Used but not in past month: 479 (21%) Used in past month: 344 (15%) Wine/Liquor 8th grade: Never used: 1161 (52%) Used but not in past month: 644 (29%) Used in past month: 445 (20%) 3-drink episodes 7th grade: Never used: 1919 (85%) Used but not in past month: 151 (7%) Used in past month: 180 (8%) 3-drink episodes 8th grade: Never used: 1740 (77%) Used but not in past month: 237 (11%) Used in past month: 272 (12%) The watched TV shows exposure index showed a consistent association with subsequent alcohol use across levels of cofounder adjustment and types of outcome. In the fully adjusted model, each one standard deviation increase in alcohol advertising exposure as measured by the watched TV shows index was associated with a 44% increase in odds of beer drinking (95% CI=27%-61%), a 34% increase in odds of wine or hard liquor drinking (95% CI=17%-54%), and a 26% increase in odds of 3-drink episodes (95% CI=8%-48%). The watched TV sports index was associated only with subsequent beer drinking in the fully adjusted models, with a 20% (95%	**Limitations:** ▪ Observational study so possible confounders may have impacted on results - further studies required to test results. ▪ Assessment strategy used measures diverging in limitations such as likelihood of false positives and confounding. ▪ Limited in generalizability – sample is only from adolescents in public school from only one region of USA. ▪ Compared with overall US population, sample more ethically diverse and contained larger proportion of Hispanic students. ▪ Based on self-reported alcohol use – biomedical validation not conducted. ▪ Although results show consistent patterns, not all measures of exposure converge on same findings. **Comments:** ▪ Ethnic distribution similar to Los Angeles County Public Schools. ▪ Same pattern of findings was obtained for the self-reported frequency, meta-memory of exposure, with significant prospective effects on beer consumption even when effects of all confounders were adjusted for. ▪ Consistent with conclusions from previous longitudinal studies. **Reported conclusions (by authors):** ▪ A one standard deviation increase in viewing TV programmes containing alcohol commercials in 7th grade was associated with an excess risk of beer use (44%), wine/liquor (34%), and 3-drink episodes (26%) in 8th grade. Strength of associations varied across exposure measures and was most consistent for beer. ▪ Both opportunity measures of exposure predicted subsequent beer consumption. ▪ Mixed picture leans toward view that alcohol commercials have some effects on alcohol consumption in this age group. ▪ Study consistent with earlier studies suggesting exposure to alcohol advertising increases risk of subsequent alcohol use ▪ Even if risk attributable to advertising is small relative to other influences such as peers and social norms, limiting

			prior alcohol use) ▪ **Measures of Confounders** (follow-up propensity) **Data analysis:** Logistic regression models. Exposure measures and all confounders with exception of demographic variables standardized to a mean of 0 and standard deviation of 1 to allow for comparison of coefficients across exposure measures.	CI=5%-37%) estimated increase in odd per standard deviation unit. ▪ Males had higher levels of ad exposure. ▪ Hispanics appeared to have higher levels of ad exposure than non-Hispanics. ▪ Asians tended to have lower levels of ad exposures than others ▪ Other ethnic group, including multi-ethnic youth, did not show any evidence of differential ad exposures on any of the measures.	adolescents' exposure to proalcohol media messages could be important part of comprehensive strategy to prevent adolescent alcohol use.
Unger, J.B., Schuster, D. Zogg, J., Dent. C.W & Stacy, A.W. (2003) USA Underage	Correlation study	**Study setting** 8th and 10th grade classrooms in 3 high schools and 5 middle schools in Los Angeles area. Schools sampled randomly from list of public schools in Los Angeles County. Within schools classrooms of students were randomly selected to participate in the survey **Baseline sample** 2% of parents refused their child permission to	**Study Sample** 591 adolescents; mean age 14.3 years (standard deviation = 1.2 years). Sample approx ½ female and ½ Latino/Hispanic. **Outcome measures** Study examined seven different measures of exposure to alcohol advertising: general TV exposure, exposure to televised sport, perceived frequency of alcohol advertising, advertisement recognition, receptivity to alcohol marketing, recall of brand names & liking of alcohol advertisements. Alcohol use measured by asking questions on	80% of respondents were susceptible to alcohol use 64% had ever tried alcohol, 29% had ever been drunk (29%), 38% had consumed alcohol in the past 30 days 18% had been drunk in the past 30 days. Media receptivity was associated with a greater risk of lifetime alcohol use (OR 1.27; 95%CI 1.01, 1.59), lifetime drunkenness (OR 1.52; 95%CI 1.16, 1.99), 30-day alcohol use, and 30-day drunkenness. Recall of brand names was associated with a greater risk of susceptibility (OR 1.13; 95% CI 1.02, 1.25), lifetime drunkenness (OR 1.09; 95% CI 1.01, 1.18), and 30-day alcohol use. Liking of alcohol advertisements was associated with a greater risk of all 5 alcohol outcomes. Interestingly, cued recall of product type was associated with a lower risk of 30-day drunkenness.	**Limitations** • Cross-sectional results do not prove causality, longitudinal studies needed to determine direction of causality. • Results based on adolescents' self-reports of alcohol use. Some respondents might have under-reported their alcohol use to avoid punishment, although they were informed their responses would be kept confidential. • Analysis did not control for previous drinking behaviour a variable that might affect the ability of respondents to recall alcohol advertisements and express brand preferences. • No clear consensus in these types of studies about how to assess exposure to alcohol advertising. • Odds ratios are not provided for exposure with all alcohol measures. **Comments** • Examines utility of both cognitive and affective indicators in accounting for effects of alcohol advertising on adolescent alcohol use. • Strength is examination of seven different measures of exposure to alcohol advertising. • Investigated association between each of these advertising

		participate in the survey. 636 students completed survey, 591 (93%) had complete data on all variables used in the analysis.	susceptibility, lifetime alcohol use & lifetime drunkenness and 30-day alcohol use and 30-day drunkenness **Data analysis** Cronbach's alpha calculated for all multi-item scales. Correlation analyses performed to examine correlations among various measures. Logistic regression analyses performed to assess association of each advertising exposure measure with 5 measures of alcohol use.		exposure measures and alcohol use. • The prevalence rates of alcohol use are comparable to those found in national studies. • Odds ratios provided give confidence intervals. **Reported conclusions (by authors).** • **A**dolescent alcohol use associated significantly with several, but not all alcohol advertising exposure measures. • The advertising exposure measures significantly associated with alcohol use are liking of alcohol ads, recall of brand names, and media receptivity. Associations were significant after controlling for the possible confounding effects of the other advertising exposure measures. • Results suggest that both cognitive and affective responses to alcohol advertising may be risk factors for adolescent use. • Hypothesises that recognition and positive reactions to alcohol advertising lead to alcohol use, but casual process in opposite direction is also possible. Longitudinal studies are necessary to determine direction of causality.

Van den Bulck, J. & Beullens, K. (2004) Belgium Underage	**Design** Longitudinal study	**Study Setting** 15 Secondary schools in Flanders. **Sample at Baseline** 3022 secondary school students. 1648 students filled out both questionnaires & composed the analysis sample. Gender: 56.4% boys, 45.4% girls. Average age: 1st yr Boys 2003: 13.23, 1st yr Girls 2003: 13.11 4th yr boys 2003: 16.46, 4th yr girls 16.30. Grade: In 2003 52.3% 1st years, 47.7% 4th years.	**Study Sample** 1648 1st & 4th year students. **Outcome Measures** Time 1 (Feb 2003) Total TV viewing in hours. Music video exposure measured on 5 point scale from never to daily. Time 2 (Feb 2004) Quantity of alcohol consumed when going out. **Data analysis** Multiple regression analysis.	The oldest students drink more while going out than the younger students. 5th year boys drank significantly more than girls in the same age group. Overall TV viewing & music video exposure at time 1 significantly predicted the amount of alcoholic beverages adolescents consumed when going out at time 2. Results remained significant after controlling for alcohol use at time 1, gender, smoking & pubertal status. 63.3% respondents watched music videos at least several times a week, 35.6% watched them daily. 5th yr boys go out the most, 2nd yr students (girls & boys) go out least.	**Limitations** • Data on TV viewing & alcohol consumption was self-reported. • Study does not offer conclusive proof of causal link but does offer extra support for hypothesis that such a causal link might exist & that watching TV & in particular music videos might encourage adolescents to consume alcohol. **Comments** • Examined whether TV viewing & music exposure predict alcohol consumption when going out. • Study controls were gender, age group, smoking behaviour, & alcohol use (time 1) & pubertal status (time 2). • Study focused on alcohol consumed while at pubs, bars, discos, parties etc. This was to avoid the measurement problems that might occur if alcohol consumed at religious ceremonies or occasional drinking with meals were included. • Uses data from 1st & 2nd wave of Leuven Study on Media and Adolescent Health (SOMAH). • A strength of this study is its longitudinal design. **Reported conclusions (by authors).** • TV viewing habits are a significant predictor of alcohol consumption while going out. TV viewing might cause an increase in alcohol consumption or might be an early symptom of developing alcohol habits.

Zogg, J., Ma, H., Dent, C.W., Stacy, A.W. (2004). USA Underage	Correlation study (survey)	**Setting:** School districts in Southern California. **Sample at baseline**: 549 students from 8th grade (n=311) and 10th grade (n=238) Mean age = 14.1, S.D. = 1.1; Gender: 287 male & 254 female [8 unknown] Ethnicity: 61% Hispanic/Latino descent, 19.5% Asian/Pacific Islander, 7% Caucasian and 12% African American or other minority.	**Study Sample** 10 schools within those districts (3 high schools, 3 intermediate schools & 4 middle schools), were randomly selected. **Outcome measures** What might like about drinking & what might not like about drinking. 4-point scale (1=very good to 4=very bad) indicating how good or bad it would be if outcome happened to them. Alcohol use TV alcohol advertising exposure, TV sports exposure, sports involvement, observation of others' drinking behaviour. **Data analysis** Open-ended responses to outcome questions were analysed as character variables. Programme searched across all responses for letter strings in common. Frequencies were then tabulated for each letter variables. Chi square analyses used to examine group difference. Logistic regression analysis to further examine differences in response probabilities. Multiple regression techniques to determine relationships	Most participants (73%) had used alcohol at least once in their lives. Effects found for prediction of alcohol outcomes by exposures to sources of alcohol information were uneven. No predictive effects were significant when a Bonferroni correction was applied. Sports exposure & direct advertising exposure were not individually predictive of positive outcomes (p's >.05). Televised sources of info appeared to have effect on the alcohol intoxication variable. The more participants reported drinking, the better thy said the positive outcome would be if it happened to them. Likewise, the less 1 reported drinking, the more negative the outcome was rated. After adjusting for multiple comparisons, 1st-hand observations of others' drinking was significantly negatively associated with the negative value item (in all alcohol models) & with the positive value item (beer model only).	**Limitations** • May not generalise to other geographic locations or areas with different ethnic mix. • Based on self-report data for alcohol use and exposure. • Due to inadequate cell sizes, group difference of ethnicity could not be determined for the 4 main ethnicity categories (Latino, Asian/Pacific Islander. Caucasian, & African American & other minorities). Therefore ran analysis comparing Latinos to all others. • Cross-sectional results cannot determine causality. **Comments** • Chosen districts were representative of larger sample of districts on ethnicity, test scores, SES, English as a 2nd language, & absentee results. • Alcohol use questions from Youth Behaviour Risk Survey • Similar measures effective in previous validation studies. **Reported conclusions (by authors).** • Effects of vicarious learning are strengthened by behavioural experience. • Developmental changes coupled with results suggest a longitudinal investigation is warranted with this population to confirm cross-sectional results.

Zwarun, L., Linz, D., Metzger, M. & Kunkel, D. (2006) **USA**	Experimental study Participants filled in short questionnaire on demographics, ndividually viewed 1 of 2 videos of a TV programme (1 included 3 beer ads) with advertising & then completed a questionnaire.	**Study Setting:** Large state university on West Coast **Sample at Baseline:** 178 undergraduate students in USA 91.2 were under legal drinking age 86.5% drank alcohol "a little" or "a lot". 215 students participated in the TV viewing. 42 men 173 women. Experimental group 20 men 87 women Control group 22 men & 86 women. Participants were fairly evenly divided among freshmen, sophomores & juniors (34.8%, 33.1%, 31.5%), with only 1 senior.	**Study Sample:** Undergraduate students enrolled in introductory communications class who received extra credit for participation. 215 students. 107 watched experimental video (with beer ads) & 108 watched control video (without ads). **Outcome Measures:** If identified with TV programme How tolerant they were of Ruthie's drink driving Potential social and physical outcomes of drinking alcohol. **Data analysis:** A principal components analysis using varimax rotation was performed in SPSS.	Those exposed to ads more likely to believe in social benefits of drinking than those not exposed (p = 0.49), particularly among males (p = .17). Participants who reported seeing people engaged in risky activities as well as drinking beer had an increased tolerance for drunk driving. Suggests imagery in beer commercials can contribute to beliefs about alcohol that predict drinking and to increased acceptance of dangerous drinking behaviour.		**Limitations:** • More men than women so results might not generalise to other populations. However, gender distribution reflected overall gender distribution of communication majors at the university investigated. Any further study requires more equal gender distribution. • 178 students filled in initial questionnaire yet 215 participated in experiment (watch TV programme) itself which could have impacted on results. Study did run analyses with and without results and found they were nearly identical. • All students were on communication courses and thus likely to be more aware than other students of communicate of messages and thus results may not be generalisable to other students. • Participants asked to evaluate another person's behaviour creating possibility for attribution errors and is therefore not necessarily equivalent to asking them about their own behaviour & beliefs. • Measured impact of 3 ads in a 20 minute period which is very different to real life. Exposure to ads over decades could have very different effect. **Comments:** • Assessed effects of exposing college students to beer ads with images of activities dangerous to undertake while drinking. • Experiment was pilot tested on a convenience sample of 15 university students, who watched tape & completed the questionnaire, then gave open-ended feedback. • Participants were randomly given the control or experimental video. **Reported conclusions (by authors):** • Shows that particularly for males exposure to beer commercials can increase their belief that drinking has such a benefit. • Supports research that shows that alcohol advertising can contribute to formation of the very alcohol expectancies that predict drinking. • Those who saw beer ads no more likely to find risky behaviour acceptable than those who did not. Young people indicate that they know drunk driving is wrong, but does not necessarily mean that they will not do it. • Very important to pay attention to role alcohol advertising & other media portrayals of drinking alcohol play in young people's decisions whether to drink.
	Econometric	**Study Setting**		All estimated own-price	Almost all own-	**Limitations**

Duffy (2001) UK	modelling	Examines empirical performance of four similar systems in the econometric study of a particular set of markets (UK) where advertising effects on product demand are potent		elasticities are negative. Cross-price elasticities are positive. Quality of estimated effects on prices on demand seems reassuringly high for these models. Over same period, there has been a trend change in consumer tastes involving switch away from traditional purchases (beer) to a new favourite (wine) Conditional advertising elasticities generally very small and insignificantly different from zero which suggests that advertising does not have a large role to play in determining the product composition of any given level of total drink demand.	advertising elasticities are positive except for spirits. Alcohol advertising elasticities are minute. Therefore, if advertising is to have any effect would require a 100% increase in alcoholic drinks advertising which might 'raise' consumption by a mere 2%. Advertising appears to have no discernible effect on total drink consumption.	• Large standard errors present for alcohol advertising elasticities. **Reported conclusions (by authors).** • Advertising had no effect upon 'product composition' or 'level' of total alcoholic drink consumption in the UK from 1964 -1996. • The consumption of alcoholic drink is affected by relative prices, total consumer budgeted expenditures and, to some extent by autonomous shifts in tests. • The effectiveness of a policy of restraining consumption through taxation is limited by the low price elasticities of demand for the alcoholic beverages. • Fiscal change on consumption is attenuated further, at relatively high levels of taxation, by cross-border smuggling and arbitrage as found in UK, Canada and Sweden.
Lariviere, Larue, Chalfant, (2000) Canada	Model of price and demand for alcoholic beverages	**Study Setting** Ontario	**Outcome Measures** Estimation of price and expenditure elasticities to characterise the demand for alcoholic beverages and soft drinks.	In the PDL model, advertising expenditures on soft drinks and spirits have a negative influence on beer consumption but advertising on beer and soft drinks tend to boost consumption of spirits. Beer elasticities range form -0.59 to -1.05.		**Limitations** **Comments** • Summarises previous studies on demand for alcoholic beverages. **Reported conclusions (by authors).**

			Data analysis First model endogenizes expenditures on alcoholic beverages and soft drinks. The second sub-model is a conditional AIDS demand system that allocates expenditure derived from the first sub-model between BWS and soft drinks.	Advertising specifications can significantly affect advertising and other elastiticities. Total own-price elasticities for spirits and wine purchased in Ontario very close to unity regardless of advertising specification chosen. Own-price elasticity for beer was very sensitive to choice of advertising specification. Results for spirits indicate that advertising is still effective means to stimulate consumption.	• Industry spending on advertising is excessive, especially on part of breweries. • Game theoretic models may shed light on why breweries overspend on advertising. • Institutional factors such as Ontario's pricing restrictions might encourage advertising competition and hence spending on advertising

Table 10 Billboard & Print Media

Authors Country	Study Design	Sample and Interventions	Methods	Consumption Outcomes	Other Outcomes	Limitations and Conclusions
Austin et al. (2002) USA	Survey	**Study Setting:** Western state university (Spring 2000). **Sample at Baseline:** 520 college students	**Study Sample:** 22 undergraduate classes (520 students): 57% reported themselves as communication majors, 43% reported major outside of communications. Approx. 46% male, 54% female. Age range 17-51 yrs (M=20). 86% Caucasian. **Outcome Measures:** ▪ global attitudes to magazine advertising and alcohol evaluation of 4 magazine adverts. ▪ drinking behaviour. **Data analysis:** *t* test, hierarchical multiple regression analysis.	Individuals rating particular magazine ad portrayals as appealing did report more frequent use of alcohol and related behaviours, but the variance explained was small. Small but significant relationships also existed between perceived realism of magazines as information sources and frequency of alcohol use but not for related behaviours. Heightened awareness led to increased scepticism, as measured by trust and realism of individual messages viewed by the participants. Heightened awareness, however, did not affect the appeal of the ads.		**Limitations:** ▪ Did not measure variables using real-life experience (media-based measures) ▪ no distinction made between how students perceived norms and the extent to which they perceived those norms as desirable ▪ lack of ethnic and geographic diversity inhibits generalisability of results. ▪ magazine advertising only. ▪ Over half the students (57%) communication majors. **Comments:** ▪ Comparison – some groups had background questions prior to evaluating adverts, some groups evaluated adverts first. ▪ Individuals who evaluated ads after answering intro survey of attitudes toward advertising and alcohol, rated ads as less trustworthy and less realistic than individuals who evaluated the ads before answering the survey. ▪ Manipulation employed extremely non-invasive. ▪ Results showed that expectancies strongly predicted behaviour consistent with previous studies. ▪ Random assignment using a large battery of measures. ▪ Large sample. ▪ Focused on issues of internal reliability, appropriate to an experimental design. **Reported conclusions (by authors):** ▪ Although students may possess the abilities to process messages sceptically, these skills may need to be activated. ▪ That realism did not have much effect, on appeal suggests that appeal is more based more on enjoyment than logic. ▪ That realism and identification had small, direct effects

					on alcohol use could again suggest that further enhancement of the logical aspects of decision making, along with the motivation to apply such skills, could affect behavioural outcomes. ▪ Small relationship of magazines realism to drinking frequency was negative rather than positive and only emerged in multivariate analysis. ▪ Overall, results suggest a minimal intervention designed to enhance awareness of media-use experience can activate scepticism and have both direct and indirect effects on the message interpretation process that leads to behavioural decisions. The promise of such an intervention lies in its ability to arrive at more sceptical conclusions on their own, without campaign designers relying on preachy message strategies.
Center on Alcohol Marketing and Youth (2003b) USA Underage	Audit	**Study Setting:** Hispanic youth (ages 12-20 yrs) in 2002. **Sample at Baseline:** Hispanic population in USA 35.3 million: 40% of this population under 21 yrs.	**Study Sample:** Hispanic Youth population in USA. **Outcome Measures:** Exposure to alcohol magazine, TV and radio advertising. **Data analysis:** Gross rating points	**Magazines:** In 2002, youth in general saw 21% more advertising than adults for all alcohol, and 26% more advertising for distilled spirits (the largest category of magazine alcohol advertising). Hispanic youth even more exposed than other youth: saw 24% more alcohol advertising in English-language magazines than non-Hispanic youth, saw 24% more ads for beer and ale, 24% more for distilled spirits, 32% more for low-alcohol refreshers such as Smirnoff Ice and Mike's Hard Lemonade. **Radio:** Distilled spirits advertisers reached Hispanic youth 11% more effectively than non-Hispanic youth, while marketers of low-alcohol refreshers reached Hispanic youth 14% more effectively. Hispanic youth heard roughly the same amount of beer and ale advertising as non-Hispanic youth. All of these overexposed youth populations in general. **TV:** Audience viewing data not available. Of 15 most popular programs among Hispanic youth aged 12-20 yrs, 12 had alcohol advertising in 2002.	**Limitations:** ▪ Is population comparable? ▪ Consumption link not investigated. ▪ Conclusions based on alcohol ad occurrence data and audience data – no survey of youth conducted. ▪ Underage in USA below 21 yrs. **Comments:** ▪ Audits exposure of Hispanic youth to alcohol magazine, TV and radio advertising in 2002. **Reported conclusions (by authors):** ▪ Hispanic youth saw even more alcohol advertising in magazines than non-Hispanic youth. ▪ Hispanic youth heard more alcohol advertising on radio than non-Hispanic youth. ▪ Alcohol advertising was placed on a majority of the TV programs most popular with Hispanic youth.
Center on Alcohol Marketing and	Comparative study	**Study Setting:** African-American youth (ages 12-20	**Study Sample:** African-American Youth population in	**Magazines:** African-American youth saw 77% more alcohol advertising in national magazines than did non-African-American youth.	**Limitations:** ▪ Is population comparable? ▪ African-American youth slightly over-represented in

Youth (2003c) USA Underage		yrs) in 2002. **Sample at Baseline:** 36% of African-Americans under 21 yrs.	USA. **Outcome Measures:** Exposure to alcohol magazine, TV and radio advertising. (Comparison with non-African-American youth.) **Data analysis:** Gross rating points	African-American youth saw 66% more advertising for beer and ale, 81% more advertising for distilled spirits, 45% more advertising for low-alcohol refreshers such as Smirnoff Ice and Mike's Hard Lemonade, and 65% more advertising for wine brands. **Radio:** Significant source of African-American youth overexposure to alcohol advertising in 2002. Distilled spirits advertisers reached African-American youth 56% more effectively than non-African-American youth, beer and ale 12% more effectively. Both these overexposed youth populations in general as well as overexposing African-American adults relative to non-African-American adults. **TV:** Audience viewing data not available. Alcohol advertising on 13 of the 15 prime time regularly-scheduled programs with largest teen audiences (ages 12-17 yrs) for sample week in 2001.	general youth population (36% vs. 30%). ▪ Underage in USA below 21 yrs. ▪ Consumption link not investigated. ▪ Conclusions based on alcohol ad occurrence data and audience data – no survey of youth conducted. **Comments:** ▪ Study audits exposure of African-American youth to alcohol advertising in magazines and on radio and TV in 2002. **Reported conclusions (by authors):** ▪ African-American youth even more overexposed to alcohol advertising than non-African-American youth. ▪ Alcohol advertising was placed on all 15 of the TV programs most popular with African-American youth. ▪ Alcohol advertising in magazines overexposed African-American youth compared to non-African-American youth, reached underage African-Americans more effectively than young adult African Americans, and exhibited significant concentration of brands and magazines. ▪ Alcohol advertising on radio overexposed African-American youth compared to non-African-American youth and was concentrated in two formats and five markets.
Dring, C. and Hope, A. (2001) The impact of alcohol advertising on teenagers in Ireland. Ireland Underage	Qualitative study using focus groups.	**Study setting** The National Youth Council of Ireland's affiliated youth clubs. **Sample at baseline** n= 180, 12-14 years 33 boys, 54 girls 15-17 years 44 boys, 47 girls.	**Study Sample** Youth groups from main 5 geographical regions of Republic of Ireland randomly selected to take part. Twenty focus groups selected, 4 from each region, 2 boys' & 2 girls' groups, one each of two age groups, 12-14 & 15-17 years. **Outcome Measures** Drinking patterns –	**Drinking patterns** 12-14 yrs boys Drink monthly 34%, Beverage type at least monthly: Beer 26%, Cider 21%, Spirits 9%, Alcopops 18%. Being really drunk 29%. 12-14 yrs girls Drink monthly 24%, Beverage type at least monthly: Beer 15%, Cider 15%, Spirits 17%, Alcopops 13%, Wine 6%. Being really drunk 29%. 15-17 yrs boys Drink monthly 64%, Beverage type at least monthly: Beer 41%, Cider 32%,	**Limitations** • Small sample only 180 adolescents, which limits strength of findings & generalisability. • Significantly more girls than boys in 12-14 years sample • When drinking patterns of participants were compared with HBSC Irish data there were differences meaning that results might not be generalisable. • Design means it is not possible to determine impact of advertising on adolescents beliefs about alcohol. **Comments** • Aimed to determine impact that alcohol advertising

			from questionnaire Awareness of billboard advertising – assessed by self-completion questionnaire. From focus groups: Alcohol beliefs & expectancies Alcohol advertising appeal Alcohol beliefs & advertising – including opinions of adverts viewed in focus groups. Alcohol advertising exposure If adverts viewed in study meet the Irish alcohol advertising code. **Data analysis** Content analysis was conducted on the transcribed focus group data using QSR NUD.IST, a computer package for qualitative analysis. Category system was developed using the focus group discussions which emerged from the questions.	Spirits 27%, Alcopops 21%, Wine 9%. Being really drunk 36%. 15-17 yrs girls Drink monthly 57%, Beverage type at least monthly: Beer 34%, Cider 21%, Spirits 36%, Alcopops 26%, Wine 2%. Being really drunk 34%. **Beliefs about alcohol** Twice as many negative beliefs as positive beliefs expressed in younger age groups, but a similar amount of positive & negative beliefs expressed in the older age groups. The number of positive beliefs expressed was similar in both age groups for both genders, the amount of negative beliefs expressed was significantly less in the older age groups. Most positive beliefs about alcohol concerned mood or feelings. Most often mentioned belief common to all groups was that 'having fun' was a key benefit of alcohol use. This belief was particularly strong amongst the older girls. Negative beliefs tended to be about behavioural or physical effects (e.g. hangovers, causes accidents, get into fights). Older boys had fewest negative beliefs of all groups. **Favourite advertisements** Alcohol advertisements were by far the favourite among the participants. **Appeal of adverts** Humour was the most popular ingredients or all of the groups. Other devices that appealed included animation, music, use of a sports personality, and use of animals, babies or objects with visual appeal. Adverts containing more than 1 element of appeal were among the most popular.	has on adolescents • Drinking patterns of participants in present survey compared with HBSC national survey to examine if they reflected national sample. • Use of pre-existing groups as sources of participants allowed for more "natural" exchange of comments. • Good sample covering 5 main geographical regions of Republic of Ireland. **Reported conclusions (by authors)** •Alcohol advertising has a strong attraction for Irish teenagers as it portrays lifestyles and images, which are part of social setting. Alcohol advertising promotes and reinforces the use of alcohol with range of activities that teenagers aspire to, engage in and enjoy. For young people 'selling aspects of alcohol advertisements relate to linking alcohol to positive images of desirable lifestyles and little to do with selling the actual alcohol product advertised. •Alcohol advertising is likely to have a greater impact among younger age groups and 15-17 year old girls than older boys. •Alcohol advertisements infringe Irish alcohol advertising code in several ways. •Alcohol advertising in broadcast media is just one aspect of a marketing mix that includes radio, print media, billboards, sponsorships and alcohol branded products. •Young people have high exposure to recurring positive messages about alcohol, which over time, help to create or reinforce attitudes & beliefs and can influence intention and subsequent drinking pattern.

				Exposure to advertising TV was most common reported source of exposure in all groups, with billboards in second place. Alcohol-branded products were a commonly reported source of exposure for the girls, with the younger groups listing more products than the older groups. **Perceptions of adverts** Nine main themes emerged from participants' perceptions of alcohol advertisements: 1. desirable lifestyle and image, 2. appeal of alcohol advertising, 3. Social lubrication, 4. Alcohol and sexual attraction, 5. Mood alteration, 6. The hidden side (negative consequences of alcohol ignored in adverts), 7. Energy provider, 8. Learning about alcohol, 9. Encouragement to drink. **Compliance with codes** Based on young people's perceptions clearly suggest that 4 alcohol adverts viewed infringe codes in several ways. Including linking of alcohol use with social or sexual success.	
Fleming et al (2004) USA Underage	Cross-sectional study	**Study Setting:** Residential households in USA in the summer of 1999. **Sample at Baseline:** 608 underaged youth 15-20 and 612 young adults aged 21 to 29.	**Study Sample:** **Underaged (15-20 yrs):** 50.2% female, 49.8% male. **Young adults (21-29 yrs):** 57.2% female, 42.8% male. **Outcome Measures:** ▪ Dependent variables (attitudes, perceptions, expectancies, underaged youth's intention	▪ Alcohol advertising influential in shaping young people's attitudes about alcohol advertising messages. ▪ Attitudes and perceptions predicted both positive expectancies and intentions to drink of those under legal drinking age, but did not affect young adult's expectancies and consumption. ▪ Positive expectancies were powerful predictors of intentions to drink and consumption for both age groups. ▪ The effects of alcohol advertising on intentions to drink of those aged 15 to 20 years were mediated by cognitive responses to advertising messages and positive expectancies. ▪ The mediation effect was not evident among those between 21 and 29 years.	**Limitations:** ▪ Single source study. ▪ Did not measure parental modelling as a control variable in analyses. ▪ No variable of peer approval of drinking. ▪ Cronbach's alpha values for some scales were not sufficiently high (e.g. for positive expectancies about alcohol drinking). ▪ Low internal consistency could be result of using only 3 question items. ▪ Low reliability could influence estimation of standardized regression coefficients. ▪ Comparability to UK? Underage group 15-20 yr olds. **Comments:** ▪ Random sample of households (used random digit

			to drink, young adults' alcohol consumption) ▪ Independent variables (exposure to alcohol advertising) ▪ Demographic & control variables (education, city size, total annual household income, having a close friend or relative who has had alcohol problems, religiosity). **Data analysis:** Regression analyses.	▪ For young people there is a greater chance of seeing TV ads for beer than TV ads for liquor when viewing TV in a typical week. Other exposure measures: on weekly basis: ▪ 97.2% of 15-20 yr olds and 95.6% of 21-29 yr olds saw liquor ads in magazines. ▪ 98.2% 15-20 yr olds and 98.5% 21-20 yr olds heard liquor ads on radio. ▪ 58.6% 15-20 yr olds & 62.7% 21-29 yr olds reported seeing outdoor billboards showing liquor products.	dialling methodology). ▪ Findings are realistic reflection of repeated exposure to alcohol advertising since did not deliberately choose advertisements that would have high appeal to young people, nor was data collected at a time of increased televised alcohol advertising. ▪ Strength of inference of causality is enhanced through use of hierarchical multiple regression analyses taking into consideration possible impacts of church attendance, having close friends or relatives that had experienced alcohol-related problems, exposure to alcohol advertising, attitudes and perceptions about alcohol advertising messages, and positive expectancies about drinking on the criterion variables. ▪ Generalisability of findings improved since analyses based on a national and more representative sample than previous research. **Reported conclusions (by authors):** ▪ Posits that exposure to alcohol advertising would have direct effect on both the 15-20 yr olds and 21-29 yr olds attitudes and perceptions about alcohol advertising messages which in turn would be translated into their positive expectancies towards drinking. The positive expectancies would then be postulated to be directly linked to one's intention to drink or actual consumption. Positive responses to alcohol advertising and information it provides led to positive expectancies about alcohol drinking for 15-20 yr olds, but not for 21-29 yr olds. ▪ Positive expectancies significantly predicted underaged youth's intentions to drink as adults as well as young adults' consumption of alcohol. ▪ Results provide support for hypothesized paths of indirect influence from advertising exposure to intentions to drink via positive expectancies for underaged youth, but do not show such links for young adults. ▪ Having close friends/relatives with alcohol-related problems was not a factor in predicting 15-20 yr olds desire for drinking.

Jernigan et al. (2004) USA Underage	Content analysis	**Study Setting:** Adults 18 and over and teens 12-17 in USA, 2000-2003. **Sample at Baseline:** **Adults:** 13,000 **Teens:** 2,300	**Study Sample:** Mediamark Research Inc (MRI) magazine readership data. **Adults:** audience estimates from the MRI spring 2002 and spring 2003 adult studies, semiannual surveys from March 2001 through March 2003 of a national probability sample of approx. 13,000 respondents 18 years and older per wave, using face-to-face interviews supplemented by a self-administered questionnaire. **Teens:** Youth audience estimates came from MRI's Teenmark 2001 and 2002 surveys of approx. 2,300 teens per year, conducted from April through July in 2000, 2001, and 2002, using a mailed questionnaire. Response rates for surveys range between 65% and 70%, and comparisons of respondents vs nonrespondents are	▪ In 2002, underage youth saw 45% more beer and ale advertising, 12% more distilled spirits advertising, 65% more low-alcohol refresher advertising, and 69% less advertising for wine than persons 21 years and older. ▪ Girls aged 12 to 20 years were more likely to be exposed to beer, ale and low-alcohol refresher advertising than women in the group aged 21 to 34 or women in the group aged 21 years and older. Girls' exposure to low-alcohol refresher (LARs) advertising in increased by 216% from 2001 to 2002, while boys' exposure increased 46%.	**Limitations:** ▪ "Underage" in US is under 21 years. ▪ Magazine advertising only ▪ No link with consumption investigated ▪ Analysis only deals with advertising placement and how effectively messages are delivered to various audiences and not effectiveness of magazines themselves. ▪ Did not consider size or content of alcohol advertisements in magazines. ▪ Beyond demographic breakdowns by age, did not examine household income, ethnicity, level of education, or other demographic variables that may help explain the placement of alcohol advertisements in magazines. ▪ Analysis did not demonstrate intent on the part of alcoholic beverage advertisers to target underage audiences directly with their messages. **Comments:** ▪ Expands on Garfield et al (2003) by including sex as a variable in analysis and separating out LAR category. Corroborates finding that industry self-regulation is not adequately protecting underage persons, especially underage girls, from routine exposure to alcoholic beverage advertising in magazines. **Reported conclusions (by authors):** ▪ Girls more overexposed to alcohol advertising than boys, compared with young adults and adults of their sex. ▪ Advertising for LARs increased dramatically from 2001 to 2002, and girls' exposure to this advertising grew much faster than boys. ▪ Exposure of underage girls to alcohol advertising is substantial and increasing, pointing to failure of industry self-regulation.

			not available. However, these are the advertising industry standard surveys for measuring magazine audiences. **Outcome Measures:** Magazine advertising occurrences Magazine advertising exposure **Data analysis:** Statistical analysis relied on gross rating points (reach x frequency)		

Mastro & Atkin (2002) USA Underage	Content analysis & survey	**Study Setting:** Mexican American high school students. Content analysis completed in March 1999 to assess themes and images of alcohol advertising within 5 miles of school. **Sample at Baseline:** 123 Mexican American students from 10th, 11th & 12th graders.	**Study Sample:** 15 yr-olds n=51 41% 16 yr-olds n=49 40% 14 yr-olds n=13 11% 17 yr-olds n=10 8% **Mean age approx 15 yrs.** 51% (n=63) female 49% (n=60) male 66% resided in a household with married parents. 57% of parents were reported to have graduated high school. 31% of parents identified as having attended some college. **Outcome Measures:** ▪ Dependent variables (drinking intention, approval of underage drinking, social perception) ▪ Independent variables (attention to billboard ads, exposure frequency) ▪ Retention (recall, brand exposure)	**Content analysis** found of 66 outdoor advertisements for alcohol surrounding high-school campus:: 27 billboards, 39 were signs. 13 of billboards for beer, 14 for hard alcohol. All 39 signs for beer. No outdoor advertisements for wine found in sample. 12 outdoor advertisements contained human models (all for hard liquor). Of 28 human models: 15 female (54%), 13 male (46%). 57% (n=16) of models Caucasian, African-American & Latino 21% (n=6). Generally, age indicated as either thirties or twenties. No human models were shown holding the product or drinking alcohol. **Survey:** ▪ On average, students identified being exposed to 4 beer, 2 wine, 3 hard liquor outdoor ads in an average week. ▪ Generally believed 83% of their age had tried beer and that 55% drank beer regularly. ▪ Estimated 74% of peers had tried hard liquor and that 43% drank liquor regularly. ▪ Students identified attending to billboards only "sometimes" and were exposed to approx. 13 billboards per month. ▪ Recall of specific slogans and images on billboards approx. 3 items. ▪ Could identify an average of nine beer and liquor brands to which been exposed. ▪ Respondents found themselves to be largely dissimilar to models in billboards.	**Limitations:** ▪ Population may not be comparable with UK ▪ Billboard advertising (in vicinity of school) only. ▪ Exposure may be disproportionately high for this group (compared with Whites) as a result of heavy concentration of such ads in Latino (and African-American/Black) neighbourhoods. ▪ Images depicted in this community were not especially salient to these Mexican-American students due to perceived dissimilarity found between models and students themselves, as well as limited representations of Mexican models. Alongside racial differences, lack of identification may be because models pictured in ads were not perceived to be high-school students. ▪ More sensitive measures of billboard themes that considered both positive and negative outcome expectancies and with greater variability in response options would be valuable. **Comments:** ▪ Evaluates images depicted on alcohol billboards and examines resultant relationship between exposure and beliefs. ▪ Relationship examined within framework of Bandura's social cognitive theory. **Reported conclusions (by authors):** ▪ Brand exposure and acceptance of positive themes related to drinking associated with more positive attitudes towards drinking. ▪ Participants reported findings consistent with results of content analysis with regard to specific images appearing on alcohol billboards in their communities, specifically people and bottles. ▪ Contrary to prevalent portrayals on billboards surrounding their school, students did not associate active lifestyles or romance with drinking. Instead students suggested party scenes were recurring theme on billboards (46%). Discrepancies suggest students are unable to distinguish between the recall of billboard images and those

			▪ Production (billboard effect) ▪ Motivation (prodrinking beliefs) ▪ Control variables (parental approval, acculturation) **Data analysis:** Multiple regression and correlational analyses.		of advertisements in magazines or TV. ▪ These advertising messages may have measurable, albeit minimal, effects on alcohol-related expectancies of high school students. ▪ Images depicted on alcohol billboards appear to have some persuasive ability on processing of messages and subsequent perceptions. ▪ Minimal support for proposition that alcohol billboards provide requisite models and incentives toward acquisition of drinking behaviours. ▪ Messages are frequent and prevalent. They depict sexy and appealing models and contain desirable outcome expectancies, potentially legitimizing behaviour and subsequently providing a cognitive model for behavioural matching.

Pasch, K. E., Kpmro, K., Perry, C. L., Hearst, M.O. & Farbakhsh, K. (2007) USA Underage	Longitudinal study	**Study Setting:** Chicago Schools **Sample at Baseline:** 4137 students were eligible for study; analysis sample was 2746 students with complete data at end of both 6th & 8th grade. 2,586 sixth-grade students in 2002-2003 school year. Ethnicity - 37% black, 33% Hispanic, and 15% white. Gender was evenly distributed Average age 12.2 at end of sixth grade. Surveys administered in 6th, 7th & 8th grades. For this analysis using 6th grade data as corresponds with advertisement measurement & 8th grade was final follow-up survey.	**Study Sample:** 2,586 sixth-grade students in 2002-2003 school year. 61 schools, 2 had split sites so 63 school sites. **Outcome Measures:** All outdoor alcohol advertisements within 1,500 feet of 63 Chicago school sites were documented and coded for content and theme April – May 2003. Alcohol use Alcohol intentions Alcohol norms Alcohol attitudes Exposure to other types of alcohol advertising Awareness of outdoor alcohol advertising. **Data analysis:** Longitudinal mixed-effects regression analysis to determine association between number of alcohol advertisements around a school in sixth grade and student alcohol behaviours, intentions, norms, and	Exposure to alcohol advertising around schools at end of sixth grade predicted alcohol intentions at end of eighth grade. True even for students who were nonusers of alcohol in sixth grade. 931 alcohol advertisements found within 1,500 feet of 63 school sites. On average each school site had 14.8 advertisements with range from 0 (n=22) to 109 (n=1). There were 41 youth-orientated advertisements located around 19 schools (n=0 to n=6), 19 (46.6%) were for beer, 21 (51.2%) for distilled spirits & 1 (2.5%) for alcopops.	**Limitations:** • Part of RCT of alcohol-use prevention, not clear at what stage students receive intervention but if they have received intervention before longitudinal study it could have impacted on the results. • May not generalise to populations with different ethnic mixes or different geographic locations. • Analysis sample differed from full sample on mean levels of alcohol behaviours & intentions at end of 6th grade, with higher levels in full sample. • Full sample was older & had more males than analysis sample. • No statistically significant association between exposure to outdoor advertising & the alcohol behaviour subscale. • Alcohol intentions appear to be influenced by advertising. May be, in part, attributable to prevalence of alcohol behaviours at end 8th grade being relatively low in sample. Mean of the alcohol behaviour subscale was 6-.7, range 5-33, possibly leading to lack of power to detect association between alcohol advertising exposure & alcohol behaviour. • Small sample size, high loss to attrition. **Comments:** • Objectives were to (1) document and describe all outdoor advertisements surrounding schools and (2) to examine association between exposure to alcohol advertising in 6th grade & youth alcohol use, intentions, norms, & attitudes in 8th grade. • No previous study has documented all alcohol advertising in areas near school. • No study has examined longitudinal association between exposure to outdoor advertising near schools and alcohol use among adolescents. • To ensure validity of designations of advertisements as youth orientated, focus groups conducted with youth in 2 intervention pilot schools. • Particular strength supporting validity is longitudinal design.

			attitudes at end of eighth grade.			**Reported conclusions (by authors):** • Exposure to outdoor alcohol advertising around schools is associated with subsequent youth intentions to use alcohol. • Association found even among 6th grade nonusers of alcohol, suggesting than even those who have not used alcohol are still influenced by alcohol advertising. • Restrictions in alcohol advertising near schools may be warranted.
Pedersen, P. J. 2002 USA Underage Binge Drinkers	Descriptive analysis and survey	**Setting** Large Midwestern university **Baseline sample** 863 students Gender: Male 40.1% Female 59.4% Age: Under 21 53% 21 & over 47% Ethnicity: Caucasian 77.9% African American 8.6% Spanish/Hispanic	**Study Sample** Students from 28 general education courses invited to participate, 92% participated for total sample size 863. **Outcome measures** Descriptive analysis of alcohol ads in daily campus newsletter for 4 weeks before survey Alcohol use Print media reading Perceived influences of alcohol promotions	College students do perceive that their drinking patterns are influenced by alcohol promotions in campus newspaper. Self-identified binge drinkers were influenced significantly more than non-binge drinkers. Binge drinkers indicated that drink specials influenced how many night of the week they went out more than did non-binge drinkers (p<.000) Binge drinkers perceived a greater influence of alcohol promotion on what they ordered than non-binge drinkers (p<.000). Significant differences also found	Alcohol advertising was present in every daily issue of student newspaper averaging 112 column inches per issue. Average of 26 ads per week with average of 6 appearing in each Tuesday, Thursday & Friday edition. 81% of all advertising was	**Limits** • Data on consumption was self-reported. • Focused on only 1 university campus meaning that the results may not be generalisable to other geographic locations. • Limited to student perceptions and a sampling of students on 1 large Midwestern campus. • Cannot demonstrate causality. • Author recognises that alcohol marketing is pervasive in society & it would be presumptive to suggest that it is possible to accurately isolate influence of 1 particular marketing source. **Comments** • Examined perceived influence of alcohol advertising in a daily campus newspaper on the drinking behaviours of students. • Data from 2 sources: descriptive analysis of alcohol ads

		3.9% Native American .03% Multiracial 1.6% 67.7% of sample reported binge drinking (71.8% of men, 64.9% women)	on drinking behaviours **Data analysis** The alcohol advertising analysis was performed using a coding sheet. No other details were provided.	between binge and non-binge drinkers when asked about influence of drinks specials on how much they drank (p<.000) & on drink specials on which bar or club they went to (p<.000). To further explore perceived influences of alcohol promotion an ad effect & no ad effect. Ad effect binge drinkers perceived significantly more influence of alcohol advertising across all 4 drinking behaviours than did no ad effect binge drinkers. Findings were consistent irrespective of sex, age or class.	from 6 businesses aimed at students & within 1 mile of campus. 77.8% of ads offered alcoholic beverages at $1.50 or less per glass, beer or shot. Beer was focal beverage in 67.7% of ads.	in the student newspaper and a survey questionnaire of students. • Alcohol use questions were based on those used in previous national or large-scale studies. In addition 3 substance abuse specialists currently working in college health reviewed questionnaire for content validity. • Binge drinking defined as 5 or more (men) or 4 or more (women) drinks at 1 sitting, 1 or more times droning a 2 week period. • Coding sheet for content analysis alcohol ads was pilot tested and adjustments made. • 2 independent raters coded all ads. Interater reliability for all variables met or exceeded .94. **Reported conclusions (by authors).** • College students perceive that their drinking patterns are influenced by alcohol promotions in campus newspapers and that self-reported binge drinkers are influenced significantly more than non-binge drinkers. • Future work needs to move beyond perceptions and identify correlations between advertised info & students' actual alcohol consumption.
Saffer, H. (1997) Country USA	Design Econometric study	**Study Setting** Metropolitan areas in USA. **Sample at Baseline** Quarterly observations from 1986 to 1989 for top 75 ADIs in USA, includes 1200 observations.	**Study Sample** 1200 observations **Outcome Measures** Total fatalities rate – motor vehicle fatalities for all occupants, divided by population. For all ages & 18-20. Advertising - sum of alcohol advertising for spot TV, spot radio, & outdoor advertising messages.	Effect of ban on only broadcast alcohol advertising in range of 2000 to 3000 lives saved per year. This takes into account fact that ban on broadcast media would result in considerable substitution to other media. The elimination of alcohol advertising as a cost that reduces taxable corporate income is another policy option. This would raise cost of advertising by about 54%, which would reduce fatalities by about 1300 per year. Elimination of the tax deductibility of alcohol advertising would raise about $300 dollar a year in new revenue.		**Limitations** • Caution needed when interpreting findings for countries other than USA. • USA has different alcohol consumption patterns, rates of motor vehicle fatalities and amount of advertising spend to other countries meaning results might not be applicable. **Comments** • Estimates empirically effect of alcohol advertising on motor vehicle fatalities. • First study to measure effect of advertising directly on motor vehicle fatalities; previous studies have examined effects on alcohol consumption. • Uses market-specific price of advertising - an important variable in treatment of simultaneity bias & in

			Data analysis Regression modelling.		estimating price elasticity of alcohol advertising. • Uses metropolitan areas as unit of observation. Almost all prior studies have used national aggregates. Use of metropolitan areas adds important cross-sectional variance to the data. It also increases number of observations in data set to more conventionally acceptable level than data sets from previous studies. • Unit of observation in this data set is aggregation of counties know as an area of dominant influence (ADI). The Arbiton Company (1990) has defined ADI for all TV markets in USA. ADI is similar to but somewhat larger than metropolitan statistical area. • 75 included TV markets account for more than 75% of population. • Motor vehicle fatalities are best empirical measure of drunk driving available. Whilst not all motor fatalities are result of drink driving, there is a strong correlation between the 2 measures. • 5 independent variables are included in 4 regression: real per-capita personal income, median year of schooling, unemployment rate, percent Afro-American & percent Hispanic. • **Reported conclusions (by authors).** • Alcohol advertising is contributing factor in high level of motor vehicle fatalities in USA. • While advertising is significant it is less important than alcohol price as determinant of motor vehicle fatalities. • If a ban on broadcast alcohol advertising did not also include bans on other alcohol marketing effect on motor vehicle fatalities might be in range of 2000-3000 lives saved per year. • Elimination of tax deductibility of alcohol advertising could reduce alcohol advertising by about 15%, reduce motor vehicle fatalities by about 1300 death per year & raise about $300 million a year in new revenue.

Table 11 Alcohol promotional items (APIs)

Authors Country	Study Design	Sample and Interventions	Methods	Consumption Outcomes Other Outcomes	Limitations and Conclusions
Fisher, L. B., Williams, I., Austin, B., Camagro, C. A., Colditz, G. A. (2007) USA Underage Binge drinkers	Prospective cohort study	**Study setting** Participants recruited in 1996 by identifying mothers from ongoing Nurses' Health Study II who had children aged 9 to 14 years. **Sample at baseline** 5111 adolescents Age: 11-18 in 1998 Gender: 3283 girls 2228 boys	**Study Sample** 5511 Growing UP Today Study participants. **Outcome Measures:** First whole drink of alcohol and binge drinking. **Data analysis:** Multivariate logistic regressions.	Between 1998 and 1999, 611 girls (19%) and 384 boys (17%) initiated alcohol use. Possession of or willingness to use alcohol promotional items was associated with an increased likelihood of alcohol initiation, for boys (p=0.08), for girls (p = 0.004). 149 girls (5%) and 112 boys (5%) engaged in binge drinking in 1999. Among girls, possession of or willingness to use alcohol promotional items was associated with binge drinking.	**Limitations** • All data collected was self-report. • Study was limited to analysing those measures included on GUTS questionnaire and did not examine other potential predictors of adolescent alcohol initiation, e.g. family history of alcoholism. • Although the GUTS cohort includes participants from across USA, it does not represent a random sample of adolescents. Participants are predominantly white (94%) & their mothers hold nursing degrees. These factors limit the generalisability. **Comments** • Aims to identify precursors of adolescent alcohol initiation and binge drinking. This data extraction focuses on data related to the owning of alcohol promotional items. • Longitudinal nature of data allowed team to draw conclusions about temporal effect of multiple factors on adolescent alcohol behaviour. • Growing Up Today Study (GUTS) investigates a large nationwide cohort of adolescents. **Reported conclusions (by authors).** • Owning or being willing to use alcohol promotional items had a greater impact than advertising on alcohol behaviours, increasing risk especially among pre-contemplators. • Owning or being willing to use APIs was further associated with binge drinking among girls. • A positive association between awareness of alcohol advertising & alcohol initiation was limited to boys who were pre-contemplators. • Alcohol promotional items appear to encourage underage alcohol initiation and binge drinking; this may warrant marketing restrictions on the alcohol industry.

Hurtz et al. (2007) USA Underage	Cross-sectional survey	**Study Setting:** California middle schools. **Sample at Baseline:** 2125 sixth, seventh & eighth graders in 3 California middle schools.	**Study Sample:** 2125 (78% participation rate). **Outcome Measures:** ▪ Alcohol use (adolescent, parental, peer) ▪ Exposure to alcohol promotion (retail advertising, owning alcohol promotional items) ▪ Psychosocial risk factors for alcohol use **Data analysis:** Odds ratios. Pooled multiple logistic regressions.	▪ 2/3 of middle school students reported at least weekly visits to liquor, convenience or small grocery stores where alcohol advertising is widespread. Such exposure was associated with higher odds of ever drinking, but was not associated with current drinking. 1/5 students reported owning at least 1 alcohol promotional item. These students were 3 times more likely to have ever tried drinking and 1.5 times more likely to report current drinking than students without such items.	**Limitations:** ▪ Cross-sectional design. ▪ Adolescents who drink could be selectively exposed to alcohol ads in stores & APIs. ▪ Possible that some other, unmeasured variable may underlie observations in this study. ▪ Quantity of alcohol consumed by those who reported current drinking was not assessed. ▪ Cannot assume that all adolescents who are exposed to ads paid equal attention to them. ▪ Without taking into account the influence from other sources (e.g. broadcast media) it is difficult to determine the unique impact store advertising has on alcohol use. ▪ Study conducted in a single California community, thus additional research needed to determine whether findings generalize to other communities. Although sample typical for California, large Hispanic population is likely to be different in other states. **Comments:** ▪ Although previous research demonstrated a relationship between college students' exposure to alcohol ads in stores and their binge drinking (Kuo et al 2003), results of this study suggest the preponderance of alcohol ads in stores may also have an impact on younger audiences. ▪ Findings consistent with research demonstrating that adolescents' exposure to other forms of alcohol advertising, such as TV and magazine ads, promotes alcohol use (Martin et al 2002, National Research Council and Institute of Medicine 2003). **Reported conclusions (by authors):** ▪ Demonstrates that association of owning APIs and alcohol use persists even after controlling for social influences, such as exposure to peers who drink, and individual differences, such as propensity for risk taking, as well as parent characteristics including parent alcohol use and maternal supervision.

Workman, J. E 2004. USA Binge Drinkers	Cross-sectional study	**Setting** Midwestern University. Spring and fall semesters 2001 **Sample at baseline** 320 students Gender: 180 male and 140 female Age: range 18 - 25, mean age 20.54 Year in school: Freshman 35 Sophomores 80 Juniors 149 Senior 53 Other 3 Race/ethnicity: African American 36 Asian American 25 Hispanic 6 Native American 2 Caucasian 236 Other 52	**Study Sample** 320 students from large lecture classes at Midwestern University. Instructors agreed to research assistants collecting data then participants volunteered. **Outcome measures** Demographic items Environmental exposure to alcohol Alcohol use Perceived parental approval of drinking. Ownership of alcohol promotional clothing items (APCIs) Visibility of APCIs 5-category ordinal measure used to categorise individuals drinking behaviour: established drinker, susceptible experimental drinker, non-susceptible experimental drinker, Susceptible non-drinker and non-susceptible non-drinker. **Data analysis** Statistical analysis of survey results, MANOVA conducted & univariate F-tests produced.	96.3% had tried drinking alcohol: beer 85.3%, wine 83.4%, liquor 81.6% & other 14.4%. 65.3% had consumed alcohol in the past 7 days; 79.7% had used alcohol in the past 30 days, 38.4% of those who drank so much they became “drunk” indicated that the last time that had happened was in the past 7 days. 48.8% indicated “I drink at least once a week but not every day” as the statement that best described their drinking. 44.7% owned an APCI. Among 34 alcohol brand names reported, Budweiser, Bud Light, Miller Lite, Corona and Miller were most prevalent brand names on the APCIs. T-shirts & hats were the most commonly owned APCIs. The mean number of items owned was 4 , range 1 - 51. Most frequent source of APCIs were alcohol vendors & retail stores. Males more likely to own APCIs than females. More than 61% of established drinkers, 23% of susceptible drinkers, 14% of non-susceptible on-drinkers, 9% of non-susceptible experimental drinkers and 33% of susceptible non-drinkers owned APCIs. Participants who owned an APCI differed in alcohol-use from non-owners. APCI owners compared to non-owners were more likely to have indicated that they had drunk alcohol in last 7 days, drink at least once a week, that the last time they were drunk was in last 7 days & that they intend to drink in he future. Participants who had received an APCI from their parents were likely to perceive that their parents approved of them drinking and were more likely to report that the last time they were drunk was in last 7 days.	**Limitations** • More males than females so results may not generalise to female students. • Small sample size. • Results represent only one Midwestern university so study results may not be generalisable to other geographic locations. • Survey was based on self-report data although anonymity ensured to encourage reliability. • Participants volunteered to participate, possible distortion of results due to type of students who would volunter. • A greater number of participants were in the established and experimental drinking categories so % for non-susceptible and non-drinkers should be interpreted with caution. • Results are limited by cross-sectional nature. The direction of causality cannot be established by a study conducted at 1 point in time: a longitudinal study would be necessary. **Comments** • Examines ownership & visibility of APCIs among a group of university students & to examine the association between APCI ownership and alcohol use. • Items in questionnaire adapted from The American Drug & Alcohol Survey and questionnaire used in study to collect data on regarding cigarette promotional items. • External validity of questionnaire was measured by comparing results of reported alcohol use from this sample with those from nationally representative samples. Results from this study (which was not a nationally representative sample) showed slightly higher prevalence of alcohol use in the past 30 days. **Reported conclusions (by authors).** • Presence of alcohol promotional clothing items contributes to already saturated pro-drinking social context prevalent on college campuses. • Empirical studies establishing link between alcohol use and APCIs can support proposals to restrict production & distribution of APCIs. • Longitudinal study necessary to establish direction of causality

Workman (2003) USA Underage	Cross-sectional study	**Study Setting:** Public school students in grades 7-12 from four schools in a Midwestern state, Dec 2000-Feb 2001. **Sample at Baseline:** 154 females and 106 males in grades 7 through 12.	**Study Sample:** 154 female, 106 males (2 missing data on gender). Age range 12-18 yrs (M=14.79). 205 Caucasian, 36 African-Americans, 21 other racial groups. **Outcome Measures:** ownership and visibility of alcohol promotional clothing items (APCIs) association between ownership and alcohol use **Data analysis:** descriptive statistics, *t* tests, chi-square tests.	76.3% had tried drinking alcohol. More than 36% owned an APCI. There was a difference among groups: 89.3% of established drinkers, 36.2% of susceptible experimental drinkers, 33.3% of susceptible non-drinkers, 28.9% of nonsusceptible experimental drinkers, and 17.5% of nonsusceptible non-drinkers owned ACPIs. Participants who received an ACPI from parent were more likely to perceive that their parents approved of them drinking.	**Limitations:** ▪ Twelfth grade age 17-18 (18 yr olds not underage in UK). ▪ Cross-sectional nature of data prevent inferences of causality regarding the direction of influence. ▪ Direct generalization to other populations is not warranted. **Comments:** ▪ Not only did more than a third of participants own APCIs, but nearly 30% also indicated they would like to own something (or something else) with an alcohol brand name or some depiction of alcohol on it. **Reported conclusions (by authors):** ▪ APCIs probably play a role in drinking initiation by young people, but promotional items are among many cultural factors contributing to drinking initiation among people. Of particular importance, however, is the fact that alcohol promotional items represent a cultural factor that is modifiable.

Table 12 Studies linking advertising bans and other restrictions to consumption

Authors Country	Study Design	Sample and Interventions	Methods	Consumption Outcomes	Other Outcomes	Limitations and Conclusions
Chisholm et al (2004) Many countries	Population model projects effect of 2%-4% reduction in incidence of hazardous alcohol use based on Grube & Agostinelli, (2000); Saffer (2000) and Saffer & Dave (2002)	**Study Setting** 12 epidemiological WHO subregions	**Study Sample** Includes EurA data **Outcome Measures** Costs in international dollars ($) **Intervention effects in** Disability-adjusted life years. **Data analysis** Average and incremental cost-effectiveness ratios (CERs were computed)	In populations with high prevalence of heavy drinkers (more than 5%) [e.g. Europe and North America] most effective and cost-effective intervention was taxation (500 DALYs averted per million) In populations with lower prevalence of heavy drinking taxation less effective than brief physician advice, roadside breath testing and advertising bans.		**Reported conclusions (by authors).** Most efficient intervention response depends on prevalence of heavy alcohol use (related to overall per capita consumption). Population-based measures such as taxation most effective in populations with high or moderate levels of heavy drinking. More targeted interventions are indicated in populations with lower rates of hazardous alcohol use.
Baker (2000) USA	Time series analysis	**Study Setting** Mexican government held elections during which alcohol sales were prohibited from midnight Friday night through 10 am Monday. Survey operation along the Tijuana border since 1997. **Sample at Baseline** N= 5725 72.2% men **Ethnicity**	**Study Sample** 5725 pedestrians and drivers on non-election survey nights. 84% pedestrians 90.4% drivers. Election weekends 426 pedestrians and 139 drivers. 87% pedestrians 94.2% drivers. **Outcome Measures** To record BAC and drinking data from pedestrians and drivers as they cross San Diego through to San Ysidro. **Data analysis** 15-month time series analysis of pedestrians crossing into San Diego on	Reduced number of crossers on Saturday election nights by 71.2%, from 5,077 to 1,464. On election Friday nights there were more pedestrians with BACs >0.08 than non-election Friday nights. However the number of pedestrians with BACs >0.08 decreased throughout the night compared to an increased in non-election nights. The average night count of drivers crossing on election Saturdays, decreased by 29.3% (from 4,070 to 2,876). However they increased 12.8% on Friday nights. The number of drivers with DUI >0.08 decreased during election weekends. A noticeable decrease from 255 violators on non-election Saturdays to 22 on election Saturday.		**Limitations** • Individuals who were impaired under influence of alcohol were not interviewed even though they were less than 0.01% of total number of sample crossers. • Unexplained low counts of pedestrian traffic in November and January. • Recording of pedestrian crossing were between 12-5am. • Drive data was sampled only for 1997's election. • Only two election weekends were included in the study.

		42.9% Hispanic 35.2% White 7.2% Black 5.6% Asian 2.7% Other	Friday night between 12-5am. Analysis of drinking behaviour on election Friday by differences in the estimated number of crossers with BACs >0.08.		• Banning of sales in one locale does not prevent drinking in another. **Reported conclusions (by authors).** • Demonstrates relationship between availability and consumption. • Closing of Tijuana's alcohol establishments reduced number of border crossers and BACs of returnees. • Alcohol-related crashes and crime and emergency data required to determine whether availability of alcohol across the border will result in an overall reduction in societal costs of youthful binge drinking.
Lai et al (2007) Estonia	Cost effectiveness model	**Study Setting** Estonia **Sample at baseline** Major postal health survey of general population; mortality registry data; morbidity rates based on review of literature; patient related costs from health insurance database.	**Outcome Measures** Costs in Estonian Kroon for 2000 Effects in Disability Adjusted Life Years averted **Data analysis** Uses standard WHO-CHOICE methodology	Increased excise taxes are most cost-effective intervention to reduce hazardous alcohol consumption 759 EEK (€49) per DALY averted. Imposing additional advertising bans would cost 1331 EEK (€85) per DALY averted to reduce hazardous alcohol consumption Compared to WHO-CHOICE regional estimates, interventions were less costly and more cost-effective in Estonia.	**Limitations** All interventions evaluated against a "do nothing" scenario. **Comments** Implementation time span is 10 years but follow up modelled over 100 years. **Reported conclusions (by authors).** First priority is increased taxation, followed by advertising bans and other interventions. Differences between WHO-CHOICE regional cost-

					effectiveness estimates and contextualised results underline importance of country level analysis.
Makowsky & Whitehead (1991) Estonia	Cost effectiveness model	**Study Setting** Saskatchawan, Canada	**Study Sample** Data on monthly sales of beer, wine and distilled spirits were examined for 1981-1987. **Outcome Measures** Sales of alcoholic beverages **Data analysis** Box-Jenkins time series techniques used to estimate statistical relationship between policy change and volume of sales of alcoholic beverages.	▪ Results revealed that sales of beer increased and sales of spirits decreased following the change in legislation that permitted alcohol advertising in Saskatchewan. ▪ There was no impact on wine and total alcohol sales from the introduction of alcohol advertising. ▪ Alcohol advertising may have produced a substitution effect with respect to beer and spirits, but this was not predicted.	**Comments:** 58-year ban on advertising of alcoholic beverages was lifted in Saskatchewan in 1983. **Reported conclusions (by authors).** Suggests alcohol advertising is not contributory force that influences the overall level of alcohol consumption.

Nelson, J. P. 2003 USA	Longitudinal study	**Setting** 45 USA states 1982-1997 **Baseline sample** 720 observations.	**Study Sample** 45 USA states 1982-1997 5 states and the District of Columbia were not included in the sample for various reasons. **Outcome measures** Alcohol consumption per capita is measured in equivalent units of pure alcohol or ethanol. Alcohol beverage consumption Alcohol prices obtained from quarterly surveys conducted by American Chamber of Commerce Researchers Association. **Data analysis** Regression models for the 45 states, subsamples for licence state only & for 2 sub periods 1982-1988 & 1989-1997. The econometric method is generalised for least-squares, with correction for cross-sectional heteroscedasticity.	Overall mean total alcohol consumption was 2.36 gallons per capita. Mean in 1982 was 2.63 compared with 2.17 gallons in 1997. A restrictive law that applies only to one beverage (or one form of advertising) can result in substitution toward other beverages (or non-banned media). Monopoly control of spirits reduces consumption of that beverage and increases consumption of wine. The effect on beer is positive, but is not statistically significant. The net effect on total alcohol is significantly negative. Higher minimum legal drinking age laws have negative effects on beverage and total alcohol consumption. Bans on advertising do not reduce total alcohol consumption, which partly reflects substitution effects.	**Limitations** • Focuses on USA advertising regulations limiting applicability to UK & other geographic locations. • Data is from 1982-1997 and may not reflect current situation. • Separate analysis of effects by age group is not possible using this data. **Comments** • Analyses several restrictive alcohol regulations including includes: advertising bans for billboards, bans of price advertising, state monopoly control of retail stores, changes in minimum legal drinking age. • In contrast to previous research, allows for substitution among beverages as response to regulation targeting specific beverage. • In contrast to previous studies examines effects of these laws for total alcohol consumption as well as consumption of the 3 beverages. Previous studies have examined demand by beverage (usually spirits) not total alcohol consumption. • Longitudinal study provides evidence regarding long-term effectiveness of advertising

					bans on consumption. • From 1989 all 50 states had uniform minimum purchase age of 21 for all forms of alcohol, before this there was variation between states. • Standard deviations provided for all means. **Reported conclusions (by authors).** • Monopoly control of spirits reduces consumption of beverage, and increases consumption of wine. • Effect on beer is positive but not statistically significant. Net effect on total alcohol is significantly negative. • Higher minimum legal drinking laws have negative effects on beverage and total alcohol consumption. • Bans on advertising do not reduce total alcohol consumption which partly reflects substitution effects. • Demonstrates possible unintended consequences of restrictive alcohol regulations.

Nelson & Young (2001) Comparison of 17 OECD countries.	Empirical study	**Study Setting:** 17 OECD countries for the years 1977-1995: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, the **United Kingdom**, the United States. **Sample at Baseline:** Average population in 1995 was 32 million, with a standard deviation of 62 million. This includes Luxembourg and USA which might be outliers, and regression results are reported with these countries excluded.	**Study Sample:** As baseline. **Outcome Measures:** ▪ Alcohol consumption ▪ Alcohol abuse ▪ Cirrhosis mortality rate ▪ Road fatality rate ▪ Price growth (all in relation to advertising bans) **Data analysis:** Regression, log-linear and logit models.	▪ Alcohol consumption is positively affected by per capita income, tourism, and measure of drinking sentiment. ▪ Alcohol consumption is negatively affected by the real price of alcohol and the percentage of elderly population. ▪ The unemployment rate is statistically insignificant. ▪ The advertising ban variables are statistically significant in some specifications, but not in others. When the ban variables are significant, regression coefficient signs are positive, which indicates that advertising bans are associated with increased consumption of alcohol. ▪ Cirrhosis mortality: estimates indicate positive relationship with income and drinking sentiment, and a negative relationship with alcohol price, elderly population, and the unemployment rate. The advertising ban variables are never statistically significant. ▪ Motor vehicle fatalities: positively affected by income and youth population, and negatively affected by elderly population and the unemployment rate. The advertising ban variables, when they have significant coefficients, have positive signs.	**Limitations:** ▪ Isolating effects of advertising is difficult empirically due to complexity of alcohol control policies in various countries, including public ownership of production and retailing, varying tax rates on alcohol, and strict laws on drink-driving. Because it is not possible to control directly for these differences, it may be incorrect to regard advertising ban variables, especially those for Scandinavian countries, as measuring restrictive policies on advertising exclusively. However, these other policies should bias results towards significantly negative coefficients, which is not found in this study. **Comments:** ▪ Results consistent with literature, including previous cross-country studies of advertising bans (Young 1993, Calfe & Schergara 1994, Calfee 1997), studies of partial bans of billboard displays, studies of temporary bans, and other long-standing bans of most media, and studies of advertising expenditures using annual and quarterly data. ▪ Included two demographic variables and the unemployment rate as controls, omitted from previous studies. The demographic variables are always

					statistically significant. Unemployment rate and youth variables are especially important for motor vehicle fatalities. Estimates obtained in earlier studies may suffer from omitted variable bias. **Reported conclusions (by authors):** ▪ Does not support notion that bans of broadcast advertising of alcoholic beverages reduce consumption or alcohol abuse. ▪ A complete ban on broadcast advertising of all beverages has no effect on consumption relative to countries that do not ban broadcast advertising. ▪ Fails to provide evidence that advertising bans do not have significant negative effects on alcohol abuse outcomes, including cirrhosis mortality and road fatalities. Suggests ad bans do not have large impact on drinking, although bans may affect brand and beverage choices. ▪ Despite long-standing use of adv. bans in many countries, other economic and cultural factors may be more important as determinants of drinking patterns and consumption. ▪ Alcohol price consistently negatively related to consumption and abuse. Supports economic model of ad bans and consumption.

Saffer, H. (1991) Country International	**Design** Pooled time series analysis	**Study Setting** 17 countries **Sample at Baseline**	**Study Sample** Data from 17 OECD countries for period 1970 to 1983. **Outcome Measures** Per capita consumption of pure alcohol, liver cirrhosis mortality rate, motor vehicle fatality rate. **Data analysis** Regression modelling.	Countries with bans on spirits advertising have about 16% lower alcohol consumption than countries with no bans. Countries with bans on beer & wine advertising have about 11% lower alcohol consumption than countries with bans only on spirits advertising. Countries with bans on spirits advertising have about 10% lower vehicle fatality rates than countries with no bans. Countries with bans on beer & wine advertising have about 23% lower vehicle fatality rates than countries with bans only on spirits advertising.	**Limitations** • Data included from 1980-1983. Significant changes have occurred in intervening years so may not be applicable. • International data set provides difficulty in measuring other determinants of consumption that occur across countries. For example, cultural differences might affect alcohol consumption across countries even after observable phenomena, such as price & income, are controlled. Unfortunately, quantitative info measuring all factors influencing alcohol consumption across countries does not exist. Omission of these variables could result in biased estimates of effects of advertising bans. **Comments** • Examines effect of banning broadcast advertising of alcoholic beverages. • International data set is only way to measure effect of a ban on alcohol advertising. Data from 1 country cannot be used since changes in alcohol advertising bans are rare & imposition of a ban requires extended period for consumption to adjust. There is, however, considerable variation in use of advertising bans across countries. • Few prior studies of effect of ban of broadcast advertising on alcohol consumption. **Reported conclusions (by authors).** • Countries that have adopted advertising bans have lower levels of alcohol abuse. • Advertising bans have significant effect in reducing all 3 measures of alcohol abuse.

Saffer, H. & Dave, D. (2002) 20 countries	Pooled time-series analysis	**Setting** Uses data from 20 countries over 26 years (1970-1995). 20 countries all members of OECD as OECD countries have attempted to maintain a database of comparable economic and social data since 1960. **Baseline sample**	**Study Sample** 20 OECD countries, 4 OECD excluded as do not report necessary data. **Outcome measure** Per capita annual consumption of pure alcohol in litres. Number of alcohol advertising bans enacted in each country. Alcohol price variable in USA Dollars. Annual production of wine and beer. Real income Public attitudes towards bans. **Data analysis** Developed an empirical model which is a simultaneous equations system which treats both alcohol consumption and alcohol advertising bans as endogenous.	Alcohol advertising bans decrease alcohol consumption. Alcohol consumption has positive effect on legislation of alcohol bans. An increase of one ban can reduce alcohol consumption by 5% to 8%. Alcohol elasticity is estimated at about 0.2.	**Limitations** • Summary covers several types of empirical studies (time series, cross-sectional, ban studies), which do not yield common effect sizes. Studies cannot be compared on consistent basis. • Summary of time-series studies includes quarterly & annual data, are not necessarily comparable. • Results are listed for significant effects at beverage level, even though total alcohol consumption is focus of their empirical investigation. • 2 empirical studies use cross-sectional USA data which has limitations when studying advertising. • Does not list OECD countries included or 4 excluded. • Examination of data indicated possible serial correlation. Huber standard errors, using country as cluster variable, were estimated for all coefficients to correct for serial correlation. • For several countries, or time periods within countries there were no alcohol advertising bans so variable = 0. Large number of zeros makes ban variable non-normal which can affect standard errors in equations using ban as dependent variable. Estimates determined that non-normality of ban variable is not an important problem. **Comments** • Examines empirically relationship between alcohol advertising bans and alcohol consumption. • Use of international data is effective method for measuring effect of ban on alcohol advertising. Data from 1 country are not as useful since changes in alcohol advertising bans within countries are rare & imposition of a ban may require extended period for consumption to adjust. There is, however considerable variation in use of advertising bans across countries. • International data set provides more changes in ban status than a single country data set. • International data set also provides time variation which is not available in an individual level cross

					sectional data set. • Wu-Hausman test conducted to determine if bans and consumption are hypothesised endogenous. Results provided enough evidence. **Reported conclusions (by authors).** • Alcohol advertising bans decrease alcohol consumption. Alcohol consumption has positive effect on legislation of alcohol bans. • Exogenous decreases in alcohol consumption will decrease probability of enactment of new bans and undermine continuance of existing bans. Canada, Denmark, New Zealand and Finland have recently rescinded alcohol advertising bans. Alcohol consumption in these countries may increase or decrease at slower rate than if advertising bans had remained in place.

Saffer & Dave (2003) USA	Longitudinal study	**Study Setting:** USA adolescents (1996-1998). **Sample at Baseline:** Two datasets: 1. Monitoring the Future (MTF) survey: **63,000** high school students (8th, 10th & 12th graders). 2. National Longitudinal Survey of Youth (NLSY): approx. **10,000** youths aged 12-16 yrs old. Data includes individuals who are not in school & data from parents.	**Study Sample:** As baseline. **Outcome Measures:** ▪ Causal link between alcohol advertising & youth alcohol participation (consumption). ▪ Price elasticities. **Data analysis:** Empirical analysis.	Models estimate current period consumption as function of current or past period advertising. Advertising price strongly affects level of advertising, but has no direct effect on youth alcohol participation. Results indicate that males participate more than females and that male participation is explained more by demographics than public policy. Past month price-participation elasticity was estimated at about -0.28 and price-binge participation elasticity estimated at about -0.51.	**Limitations:** ▪ Includes only local advertising. ▪ In NLSY97 data set, controlling for individual heterogeneity increases effects of advertising. Suggests results from MTF may understate true effects. **Comments:** ▪ Nelson (2001) describes limitations to Saffer's previous studies. **Reported conclusions (by authors):** ▪ Homogeneity of two independent data sets increases confidence in results. ▪ Results from MTF and NLSY97 generally show alcohol advertising has positive effect on annual alcohol participation, monthly participation and binge participation. Alcohol price generally has negative effect on participation measures. ▪ Price and advertising effects are generally larger for females, but otherwise coefficients are about same. ▪ Elasticity of advertising with respect to past month participation estimated at about 0.08 and with respect to binge participation at about 0.14.

					▪ Complete elimination of alcohol advertising could reduce adolescent monthly alcohol participation by about 24 percent and binge participation by about 42 percent. ▪ Price elasticities for past month participation was estimated at about –0.28 and binge participation elasticity at about –0.51. 100 percent increase in alcohol prices needed to reduce adolescent monthly alcohol participation by 28 percent, and to reduce binge participation by 51 percent. ▪ For monthly participation, effect of complete elimination of alcohol advertising would be similar to 100 percent increase in alcohol prices. ▪ For binge participation, effect of complete elimination of advertising would be equivalent to about an 80 percent increase in price. Advertising and price policies have potential to substantially reduce adolescent alcohol participation.
Saffer, H. & Dave, D. 2006 USA	Longitudinal study	**Setting** Uses data from Monitoring the Future (MTF) and National Longitudinal Survey of Youth 1997 (NLSY97) and looks at effect of reduction in alcohol advertising.	**Study Sample** Special version of MTF data that merged advertising & price was made available to study. Merged data set contained only a limited set of individual-specific variables. MTF data are a pool of 1996 and 1998 cross-section of 8th, 10th & 12th graders. This pool is a nationally representative sample of over 63000 high school students. Pooling of the 1996 & 1998 surveys provides sufficient samples for separate analyses of the effects of price & advertising by race & gender.	Price and advertising effects are generally larger for females relative to males. Controls for individual heterogeneity yield larger advertising effects, implying that the MTF results may understate the effects of alcohol advertising.	**Limitations** • Used self-report data for alcohol consumption. • Relevant to USA population but may not generalise to other population or geographic locations. • Focused on participation only

		Baseline sample Pooling these 2 years also provides additional time variance, especially in the alcohol advertising & price measures. NLSY97- sample consists of approx 10000 youths were 12-16 as of 31/12/1996. NLSY97 is representative of adolescents nationwide and provides important alternative to MTF by including individuals not in school & data from parents. Advertising data obtained from Competitive Media Reporting (CMR) which collects advertising data in broadcast, outdoor & other media. **Outcome measures** Alcohol price Alcohol advertising Income Alcohol consumption. **Data analysis** Production of empirical models that estimate differential effects of alcohol price & advertising by gender & race.	Results from NLSY97 suggest that a 28% reduction in alcohol advertising would reduce adolescent monthly alcohol participation from 25% to between 24 and 21%. For binge participation, the reduction would be from 12% to between 11 and 8%. Past month price participation elasticity estimated at -0.26.	as easier to measure "if drank" compared to "how much". • Data analysed is for adolescents 10 years ago who could be significantly different to today's adolescents. • Dataset is limited to 75 largest cities in USA. **Comments** • Large sample of MTF allows estimation of race & gender specific models. • Longitudinal nature of NLSY97 allows controls for unobserved heterogeneity with state-level & individual fixed effects. • Past month price-participation elasticity is estimated at -0.26, consistent with prior studies. • Reliability of CMR data is widely recognised in advertising industry. All data reported are independent estimates & do not use info from alcohol producers. • Weighted means provided for MTF & NLSY97 for all relevant variables. **Reported conclusions (by authors).** • Reduction of alcohol advertising can produce modest decline in adolescent

					alcohol consumption, though effects may vary by race and gender. • Complete elimination of all alcohol advertising with restriction on additional expenditures on other marketing techniques, or elimination of all forms of alcohol marketing, would undoubtedly result in further decreases in monthly alcohol participation & binge participation among adolescents.

Seldon et al. (2000) USA	Economic study	**Study Setting:** Advertising expenditures and beer sales data, 1983:Q1 to 1993:Q4. **Sample at Baseline:** N/A	**Study Sample:** Advertising expenditure in various media of 1000 largest advertisers in USA. Beer firms in dataset: Anheuser Busch, Coors, Genessee, Heilman/Bond, Pabst, Strohs. **Outcome Measures:** ▪ Cost and share functions ▪ Elasticities ▪ Substitution elasticities ▪ Economies of scale **Data analysis:** Econometric model.	A ban on TV and radio advertising could be effective in reducing alcohol-related problems if print media are not good substitutes for TV and radio. Results suggest that beer producers can substitute fairly easily into print advertising, so a partial ban may be ineffective if the effects are noticeable at all.	All advertising media are substitutes in promoting sales. Strong substitution possibilities from TV into both print and radio, from radio into both print and TV, and from print into radio. Suggests large-scale advertising may not create a barrier to entry due to scale economies, at least into the beer market.	**Limitations:** Samples only contain large beer products, results may not be accurate for smaller firms (data for smaller firms are not available). **Comments:** Results support evidence from research on cigarette advertising that suggests that partial bans have not been effective in reducing cigarette consumption. **Reported conclusions (by authors):** ○ All advertising media are substitutes in promoting sales. ○ Evidence of diseconomies of scale in advertising. ○ Suggests sales can be maintained using different combinations of advertising media: “it appears that the message is more important than the medium”.

Tremblay, V. J. & Okuyama, K. (2001). USA	Economic model	**Setting** USA distilled spirits marker **Baseline sample**	**Outcome measures** Market demand Price competition **Data analysis** development of an economic model	Evidence from industries with characteristics similar to those of distilled spirits indicates that elimination of advertising restrictions generally promotes price competition. If so, then elimination of the broadcast advertising ban in the distilled spirits industry will cause alcohol consumption to rise even if advertising has no effect on market demand.	**Limitations** • Appropriateness of model requires specific critique. • Not possible to establish base for discussion about different types of markets and whether distilled spirits market is oligopolistic. **Comments** • Distilled spirits producers voted to eliminate their voluntary ban on broadcast advertising. • Aims to demonstrate that conclusion that eliminating ban will have no effect on alcohol consumption is incorrect because it ignores the fact that advertising restrictions may affect industry competition as well as market demand. **Reported conclusions (by authors).** • Even if advertising has little or no effect on market demand as previous studies indicate, eliminating ban will increase distilled spirits consumption if it increases price competition. • Additionally, lower prices for distilled spirits are likely to lead to lower prices for beer and wine, further increasing total alcohol consumption. • When analysing impact of advertising on consumption, advertising may affect level

					of industry competition as well as market demand function in imperfectly competitive markets. • Recognising & accurately estimating these 2 effects is critical to an informed policy discussion about effect of advertising restrictions on consumption.

Table 13 Counter Advertising

Authors Country	Study Design	Sample and Interventions	Methods	Consumption Outcomes	Other Outcomes	Limitations and Conclusions
Andsanger et al. (2001) USA	Content analysis & survey	**Study Setting:** College students enrolled in introductory mass communication courses at a large University in the northwestern USA during Spring 1996. **Sample at Baseline:** 246	**Study Sample:** 246 students. **Outcome Measures:** • Beliefs about advertising and public service announcements (PSAs) • Media use patterns • Patterns of coviewing and discussion with family and friends • Demographic variables • Appeal and effectiveness of ads and PSAs **Data analysis:** Message interpretation process (MIP) model	None	• Prosocial PSAs tend to be associated with logic-based message traits and alcohol advertising offer college students greater emotional appeal. • For young adults, perceived realism appears to be a potentially important factor in the persuasiveness of PSAs against drinking. • Free-recall analysis indicated that there may be more than one component affecting the respondents' evaluation of perceived realism, such as denial, because many respondents indicated that the messages in PSAs were too negative to be realistic. • Participants recalled advertisements and PSAs with almost equal frequency.	**Limitations:** • Methodology may have impacted the findings: • Ads used in this study often portrayed unrealistic situations, such as time travel and dogs using beer to manipulate humans. • College students such as these respondents are conditioned to choose the right answer in multiple-choice exams. • Perhaps some social desirability crept into the responses to the semantic differential items. **Comments:** • One reason that the quantitative evaluation of realism was higher in the PSAs than in advertisements was the content of the ads themselves, two of which showed dogs ruling humans with beer. • Results support previous research that contends positive messages in PSAs may be more successful than negative (Hafsted et al 1996 – Evaluation of an anti-smoking mass media campaign targeting adolescents). **Reported conclusions (by authors):** • Perceived realism, similarity, desirability, and identification are important decision-making benchmarks that can be affected through television portrayals.

						• Antidrinking PSAs are not meeting college-age audiences' standards for personal relevance. • In the short term at least, ads have no distinct advantage over PSAs in terms of salience. The audience will not move through the logical steps of the message interpretation process model to change their attitudes toward drinking as intended by producers of PSAs because PSAs lack the type of realism with which college students might identify. Instead, the humorous and emotionally appealing aspects of the alcohol ads appear to offer greater incentive for message processing, perhaps because they are more desirable than the negativity inherent in the PSAs.
Creyer, E. H., Kozup, J. C. & Burton, S. (2002) USA & Australia Binge drinkers	Experimental study	**Study setting** 2 universities, 1 located in USA & 1 in Australia **Baseline sample** 274 students 168 USA 106 Australian. Average age of USA & Australian respondents was 21 years. Gender: 48% male, 52% female. The overall % of respondents classified as binge drinkers did not differ across respondents from the 2 countries (p>.10).	**Study Sample** 274 undergraduate students **Outcome measures** Alcohol-related attitudes & purchases intentions, perceptions of risk across various levels of alcoholic beverage consumption & perceptions of the level of problem drinking for different hypothetical consumption behaviours. **Data analysis** Multivariate analysis	Binge drinkers had stronger purchase intentions than non-binge drinkers (p<.05). The means for purchase intentions were higher for the Australian respondents (M=3.9) than the American respondents (M=2.9).	Binge drinkers have much more favourable attitudes towards getting drunk than non-binge drinkers (p<.01). Binge drinkers perceive stronger social benefits associated with drinking than non-binge drinkers (p<.01). Binge drinkers also viewed health benefits from binge drinking more favourably than non-binge drinkers (p<.01). The means for perceived health benefits were higher for the Australian respondents (M=3.0) than the American respondents (M=2.6). Less risk was perceived when USA standard warning was presented, by binge drinkers (versus non-binge drinkers), Australians (versus Americans) and at lower (versus higher) levels of consumption. These main effects need to be interpreted cautiously because of numerous two-way interactions between the independent variables.	**Limitations** • Small sample size • The results from this study are limited to the specific warnings & wording modifications to the warning may affect findings. • Used forced exposure to the beer stimuli & warning information in a classroom setting & on a single occasion. These conditions differ considerably from actual marketplace exposure to warnings & results from this study may not generalise to other exposure conditions. • Subjects were undergraduate students therefore results should not be generalised to other segments of population. • Australia & USA are both characterised with a positive attitudes toward drinking behaviours & alcoholic beverages. Future research may extend findings to other countries where attitudes towards alcohol are less positive, there is greater collectivism rather than individualism, or where other types of alcohol-related warnings had been used.

		114 respondents classified as binge drinkers, 160 as non-binge drinkers.			The influence of consumption amounts on several of the perceived risk measures was moderated by binge-drinking status. The strongest effect was found for the perceived risk associated with drinking & driving (p<.01). Binge drinkers perceive significantly less risk associated with driving after drinking than non-binge drinkers at consumption amounts up to 7 beers.	**Comments** • Research examines how 2 different alcoholic beverage health warnings placed on the label of a fictitious brand of beer influence alcohol-related risk perceptions, attitudes & intentions & characterisation of problem-drinking behaviours of binge & non-binge drinkers in Australia and United States. • One statement is the warning currently mandated by the USA Government (focused on not drinking when pregnant or before driving). The other statement is a variation of a warning recently considered by the Australian New Zealand Food Authority (ANZFA) that explicitly identifies alcohol as a drug. • A pilot study was conducted to assess consumption of students in USA & Australia. Results showed that Australian students scored somewhat higher on each of the consumption measures. In addition measures of the multi-item scales all had acceptable reliabilities across both countries & there were no problems encountered with the procedures for either the Australian or USA students. • Subjects were randomly assigned to receive to experimental conditions. 128 were exposed to the standard USA warning & 146 to the warning specifying that "Alcohol is a drug". • Strength is that experimental studies of binge-drinking behaviours across different countries are rare. • 2 countries used in this study were ideally suited for data collection because Australia has not required any warnings while a warning has been in place in the USA since 1989. **Reported conclusions (by authors).** • In general, findings reinforce suggestions that

						new, potentially stronger warning such as "Alcohol is a Drug" should be considered as one possible replacement for the current USA warning. • The pattern of lower risk perception means found for the binge drinkers in this study is consistent with prior research that shows that more frequent & heavier drinkers tend to discount alcohol warning information. • Results reinforce prior findings that show much more favourable attitudes towards getting drunk & greater perceived social & health benefits of beer consumption for binge drinkers. • Findings, coupled with prior research suggest that for binge drinkers, a more targeted communication approach aimed at changing attitudes and ultimately the behaviour of the binge-drinking segment may be more useful in impacting this group.

Flynn, B. S. et al (2005) USA	Controlled trial	**Study setting** 2 matched study areas in Vermont were identified; each comprising 8 school districts. The primary unit for sample selection was a school system consisting of a high school & its associated middle schools. TV & radio messages were directed to youth in the 8 areas from Grades 4-5 into Grades 7-8. No interventions were directed towards comparison group areas. **Baseline sample** The comparison & intervention groups showed equivalence of median household income, % of adults with a high school diploma & % with 4th year college degree. Over 99% of	**Study Sample** 2,897 grade 7-8 students in 1997 & 2,419 grade 7-8 students in 2001. **Outcome measures** Regular beer drinking Positive & negative expectations of drinking Perceived prevalence of drinking among their peers & adolescents in USA Perceived peer norms Refusal confidence Alcohol access Exposure to alcohol prevention interventions Exposure to specific messages in campaign **Data analysis** Statistical analyses was performed using SAS.	In the media area at baseline, 27.7% reported regular beer drinking, compared with 31.2% in the comparison area. The prevalence of beer drinking decreased in both the media & comparison areas to 18.3% & 19.8% respectively.	All of the hypothesized mediators of alcohol use changed in the expected direction over the 4 years of intervention. Changes in the media area were matcher, however, by changes in comparison area.	**Limitations** • Study had difficulty in achieving adequate exposure of the target audience to the messages. • Introduction into study of areas of well-funded community coalitions dedicated to substance use prevention. 4 of the 5 comparison areas & 3 of the 5 media areas had programmes. • Limitation is quasi-experimental study design, with the general study areas selected because of presumed exposure or nonexposure to specific media outlets, followed by selection of school districts in both areas with similar characteristics. • Although baseline comparisons indicated no differences between groups, non-random allocation moderates confidence in results. • Generalisability of results is limited because of the rural, white, lower-income population from which sample drawn. **Comments** • Impact of a 4-year media campaign designed to reduce alcohol use by early adolescents. • Exposure of the target audience to the media messages was lower than expected, & the unplanned community coalition interventions may have favoured the comparison area. • Districts were selected based on demographic similarity. **Reported conclusions (by authors).** • Main analysis indicated that the media interventions did not significantly affect use or its mediators. • Supplementary analyses suggested a substantial impact of community coalitions on alcohol use & several key mediators. • The mass media interventions provided by this

		population was white. Participants were evenly distributed by gender, grade & study area in both surveys.				study had no effect on adolescent alcohol use or its psychosocial mediators. • Factors external to the study reducing chances of detecting media effects. • Further work is needed to develop & test mass media strategies for alcohol use prevention among early adolescents.

Garretson & Burton (1998) USA Underage NB – this study is also included in the sales promotion evidence tables. Counter-advertising outcomes only appear here.	Between-subjects study	**Study Setting:** A high school and a university, both in southeastern part of USA. **Sample at Baseline:** 267 respondents (133 under and 134 over the legal drinking age)	**Study Sample:** Sample of university students consisted primarily of senior-level students enrolled in business classes. This sample restricted to respondents who met or exceeded the state's legal drinking age of 21 years. 96% of this sample were between ages of 21 and 30. Mean age = 22.8 years. Median age = 22.0 years. Underage sample consisted primarily of sophomore and junior-level high school students. Ages ranged from 15 to 18 years and the mean and median ages both were 16.0 years. Of total sample approx three-fifths of the sample were men (61%), and the gender percentages did not differ across the high school and college samples (chi-square <1.0, df = 1, ns). **Outcome Measures (counter-advertising only):** attitudes to warning messages (communicated on a simulated promotional T-shirt) **Data analysis:** MANOVAs with follow-up univariate tests.	Univariate results indicate that these two age groups hold different views about many aspects of the perceived risks associated with the consumption of alcoholic beverages. Those under the legal drinking age believe that the use of alcohol poses greater risks than do those over the legal drinking age (marginal means for under-age and above-age consumers are 4.5 and 3.7 respectively.	• Means, multivariate and univariate interaction and main effect results indicate that inclusion of a warning on the item does not affect attitudes toward the item, the brand or alcohol in general. • The warning manipulation affected subjects' perceptions of the beverage marketer's social concern ($F = 12.16$; $eta^2 = .08$; $p < .01$). When the beverage marketer is identified as the sponsor of the message, perceptions of the beverage marketer's social concern are significantly more favourable than for either the government-sponsored control or the control in which no warning is included (t-values > 2.6, $p < .01$, for each). However, means are not high for most of these conditions. • Although there are some univariate differences in effect of various warning conditions on consumers' perceptions of risk, the overall multivariate effect is nonsignificant. Two results relating to the warning manipulation seem particularly striking. First, risk-related means for the control condition in which there is no warning tend to be as high as the means for conditions in which warning information is included. Second, many of these means are quite high, and for risks of drinking when pregnant or driving after five drinks, several of the cells are equal to or approach the theoretical maximum of the scale. In general,	**Limitations:** • USA legal drinking age 21 years. Although in underage sample ages ranged from 15-18 years, so possibly comparable. • Underage high school students and legal-college age students from single city in southeastern USA used as subjects. Results might not extend beyond this specific sample. • Manipulations used in the study were based on both existing warning regulations and a comparison of what brand information presently can be included on a sales promotion item versus what could be included under recently proposed alcoholic beverage legislation. Findings might not extend beyond the specific warnings, brand manipulations, and treatment exposure conditions used. • Stimulus was a sales promotion item (t-shirt). Results should be interpreted only in context of this promotional domain, because they might not extend to other promotion types (e.g. advertising). **Comments:** • Findings regarding brand and item important for alcohol beverage marketers because they show that, if a warning is included, it would not have a negative carryover effect on either the sales promotion item or consumers' overall brand attitudes. • There were significant interactions between brand information and age group for the attitude and believability of the warning message. Because the legal-age college students reacted more favourably toward the message when it appeared with the brand and the character, perhaps warning information on college campuses should include such characters.

					the levels of these means are significantly higher than the scale midpoint, which suggests that the risks of driving after drinking and drinking when pregnant are well known.	**Reported conclusions (by authors):** • Results of warning message manipulation indicate that risks associated with drinking and driving and drinking during pregnancy are well-known. Effects of warnings also did not differ across the over- and under-legal-age consumers. Because messages that convey these two risks have appeared on alcoholic beverage containers for the past eight years, consumers arguably might perceive these risks to be high because this information is no longer new. At least for this sample of both under- and over-legal-age consumers, it seems as though the objective of communicating these risks have been achieved. • On basis of results, authors argue that in terms of knowledge and attitudes, there is little to be gained from continuation of these two particular warnings (drinking and driving and drinking while pregnant). • Suggests that warning messages that communicate lesser-known risks associated with the consumption of alcohol (e.g. immediate risks of addiction and combining drugs with alcohol, the long-term risks of liver disease and cancer) might provide greater benefit to consumer welfare than the messages currently on packaging. The use of rotating warning labels that convey both immediate and long-term risks, for example, might offer an effective means to communicate lesser-believed risks. Promotional items also offer an additional outlet for informing the public about the risks, and warning messages on these items might complement the mandated warnings that now appear on beverage containers. • Another important implication pertains to the

						value of a company-sponsored message. Perceptions of the social concern of the marketer were relatively poor (i.e. below the midpoint), but results indicate that the beverage marketer might reap benefits by providing proactive warning information to the public. Compared with government- and no-warning control conditions, company-sponsored messages elicited the perception that the beverage marketer was more concerned about the public. In addition, inclusion of warning on promotional item did not affect attitudes negatively toward the item or the brand.

Pinkleton et al. (2001) USA Underage	Reciever-orientated content analysis	**Study Setting:** Two schools in California's central coast area. **Sample at Baseline:** 900 ninth and twelfth grade students (64% participation rate).	**Study Sample:** 578 students: 252 ninth graders (44%) and 326 twelfth graders (54%). 263 boys (46%) and 312 girls (54%) (3 students failed to provide gender information on questionnaire). 10% (n=55) Asian, 2% (n=11) African-American, 34% (n=197) Caucasian, 45% (n=258) Latino, 1% (n=6) Native American. Remaining respondents identified themselves as "other". Respondents identified their households, on average, as middle income, and their parents' education level, on average, as having some college education without a bachelor's degree. **Outcome Measures:** • Beliefs about adversiting and pro-social advertisements (PSAs) • Media use patterns • Patterns of coviewing and discussion with family and friends • Demographic variables • Opinions about ads and PSAs shown	Behavior (unstandardized): N=490, Mean=13.7, SD=7.0, Range=6-39, Alpha=.87 Behavior Included: Have products with alcohol logos (4-point scale: none, 1-2, 3-4, 5 or more): N=534, Mean=0.9, SD=1.1, Range=0-3 [All of following on 6-point scale: never, 1-2 times, 3-4 times, 1-3 times a month, 1 time a week, over once a week] Have been offered alcohol: N=559, Mean=3.0, SD=1.7, Range=1-6 Attended party where alcohol served: N=566, Mean=2.7, SD=1.5, Range=1-6 Drank alcohol: N=564, Mean=2.4, SD=1.5, Range=1-6 Had 4+ drinks in a row: N=559, Mean=1.9, SD=1.4, Range=1-6	• Hypothesis 1, predicted that participants would rate production quality of alcohol-related advertisements (m = 47.54) more positively than production quality for alcohol-related pro-social advertisements (m = 43.74), received support in a *t-test* (t = -9.31, p < .001; df = 577). • Hypothesis 2, predicted that participants would rate the content of alcohol advertisements (m = 32.36) more negatively than content of alcohol-related pro-social advertisements (m = 47.99), also received support (t = 42.81; p < .001; df = 577). • Results for regressions supported the hypothesis for desirability, expectancies, and behavior (hypothesis 3a). • Hypothesis 3b, which asserted that positive evaluations of the production quality of alcohol advertisements would positively predict the same set of dependent variables, received support for most variables except for expectancies and behavior. • Hypothesis 4a, which asserted that favourable affect toward the content of pro-social advertisements would negatively predict beliefs and behaviors about alcohol, was largely unsupported with content positively predicting desirability and identification, contrary to the hypothesis, although negatively predicting expectancies and	**Limitations:** • Convenience sample (although sample did include adolescents from a diverse set of backgrounds). • Generalizability of study is necessarily limited by selection of messages. Purposefully selected a limited number of persuasive messages, to represent a number of key characteristics. Messages focused exclusively on the issue of alcohol rather than a variety of health issues because the use of a nested design would have been impractical. Results therefore should be replicated with other subject matter. • Important to note that pro-social messages frequently advocate less popular behaviours, which also can be more difficult to demonstrate. This gives commercial messages an inherent advantage which should be acknowledged. • Focused exclusively on video messages, this leaves open how adolescents would respond to messages in other modalities. **Comments:** High representation of minority students (such as Latinos). Dearth of ethnic differences in results lends support to the view that adolescents of various ethnicities are more similar than different in their decision-making beliefs and information-processing patterns, as has been suggested by others (Sigelman et al. 1992). **Reported conclusions (by authors):** • Teenagers' ratings of the production quality and content of persuasive messages have great relevance to their decision making. • Although PSAs received higher ratings than commercial ads for content characteristics such as trustworthiness and persuasiveness, the

			• Behaviour measures relating to alcohol (e.g. ownership of ACPIs and drinking experience) • Social expectancies for alcohol use • Perceived realism • Desirability of media portrayals of alcohol • Identification with media portrayals **Data analysis:** • Factor analysis, with reliability confirmed via the computation of Cronbach's alpha. • Series of *t-tests* on independent and dependent variables. • Message interpretation process (MIP) model.	Rode with alcohol-impaired driver: N=565, Mean=1.6, SD=1.12, Range=1-6 Got sick from drinking alcohol: N=568, Mean=1.3, SD=0.78, Range=1-6	behavior. Contrary to hypothesis 4b, which asserted that positive evaluations of production quality would negatively predict beliefs and behaviors for alcohol, PSA production values predicted only desirability. • To summarize, ratings of ads and pro-social advertisements were in the directions predicted, but only the ratings of ads had a consistent and sizable association with attitudinal and behavioural outcomes. When ratings of PSAs had a significant association with a dependent variable, the direction was either in the opposite direction of what was predicted or the variables explained little variance. Thus, the results suggested that however positively the content of PSAs were rated, these ratings did not translate reliably into the targeted outcomes. Advertisements appeared more effective than PSAs in explaining attitudes and behaviors regarding alcohol even while their content was rated less positively by the respondents.	PSAs demonstrated little apparent effectiveness. Conversely, although beer ads were rated less positively overall for content characteristics such as trustworthiness, persuasiveness, and memorability, their relative success associated with higher levels of desirability, expectancies, and alcohol-related behaviors. • Results suggest that the content of pro-social advertisements largely washes over adolescents with minimal impact on their decision making. • Production values and PSAs content increase their likelihood for effectiveness when they are both of high quality. • To summarize, commercial advertisements demonstrated more effectiveness among adolescents than pro-social ads, even while their content was rated less positively. Teenagers knew that information in the PSAs was more truthful, but their wishful thinking outweighed their logical processing.

Russell, D.W. & Russell, C. A. (2008) USA	Experimental design with control group.	**Study Setting** Southern California University **Sample at Baseline** Mean age = 22.2 years 54.8% female 45.2% male	**Study Sample** 250 Southern California University Students. **Outcome Measures** Attitude towards the episode General beliefs regarding alcohol consumption Beliefs about alcohol consequences after experiment Level of connectedness with programme (participants then divided into high & low connectedness) Alcohol consumption **Data analysis** Multivariate analysis		The findings indicate that warning viewers about embedded messages in the content of a programme can yield significant differences in viewer's beliefs about alcohol. However, the warning's impact differs depending on the viewer's level of connectedness to the programme. In particular, in comparison with the no-warning control condition, the advertising pre-warning produced lower positive beliefs about alcohol & its consequences but only for the low-connected viewers. Highly connected viewers were not affected by a warning emphasising advertising messages embedded in the programme, but a warning emphasising health produced significantly higher negative beliefs about drinking than in the control condition.	**Limitations** • These findings are based on a sample of college students & thus cannot be readily generalised to the entire TV viewing audience. Therefore, it is important that the findings are replicated with other segments. • The experimental procedures employed did not include an assessment of the viewers' own perceptions of the valence of the embedded alcohol messages. • The manipulation checks for the warning assessed whether warning participant paid greater attention to the embedded messages & their potential influence but not whether the health & advertising warning yielded different interpretations. **Comments** • This research investigates whether warning viewers about the presence of embedded messages in the content of a TV episode affects viewers' drinking beliefs & whether audience connectedness moderates the warning's impact. • Stimulus was a real episode of Two & a Half Men (THM) that had aired 2 weeks before study. THM selected based on previous content analysis findings that the series contained the most prominent messages about alcohol of all prime- time serial programmes in USA. • Study included control group (who did not see the warning) as a comparison group. • Students participated in exchange for course credit. • Alcohol consumption, age & gender were controlled for by including them as covariates in the analyses

						Reported conclusions (by authors). • The presence of many positive portrayals of drinking & alcohol product placements in TV series has led many to suggest ways to counter their influence. • Warnings about advertising messages in the episode affected only low-connected viewers. • Only the pre-advertising and post-health message warning generated significantly lower positive beliefs about alcohol compared with the no-warning condition. • However, advocates of warning should be conscious of their differential impact on high- & low-connected viewers.
Thomsen, S.R. & Fulton, K. (2007) USA Underage	Laboratory test	**Study setting** Middle School in medium-sized community in the western United States. **Baseline sample** 65 adolescents Ages 12-14 years mean age 12.8 (SD=.93) Gender: 42% boys, 58% girls Ethnicity: 84% White, 13% Hispanic, 2% Asian & 2% Native American. 2 subjects were	**Study Sample** 63 adolescents **Outcome measures** Scan path measures, total viewing time, the total number of fixations per advertisements & duration of length of each fixation. Total number of fixations & fixation duration time within each look zone (e.g. headline, company logos, responsibility message etc). Participants responses to a masked recall exercise. **Data analysis** Statistical analysis was conducted on the results.		The responsibility or moderation messages were the least frequently viewed textual or visual areas of the advertisements. Participants spent an average of only .35 seconds, or 7% of the total viewing time, fixating on each responsibility message. Subjects spent an average of .71 seconds (SD=1.16) in responsibility message look zones for the 2 advertisements whose themes emphasized moderation or caution & an average of .17 seconds (SD=.27) in the responsibility look zones for the 4 advertisements in which the warning statements were less prominent. The difference was statistically significant (p=.000). Beverage bottles, product logos & cartoon illustrations were the most frequently viewed elements of the	**Limitations** • Small sample size • Used convenience sampling method – teachers passed out fliers describing the project to inform students & parents who could then contact researchers. This sampling method would not have provided a representative sample. • Findings might not be generalisable to other areas in USA or other countries with different ethnic mixes. • Study's laboratory setting prevented a "naturalistic" reading experience. Attempted to respond to artificiality of the setting by allowing subjects to control viewing time, by not telling them that they would be questioned later about content, & by asking them to envision process of simple "flipping" through magazine while they viewed the advertisements. • The study measured recall which is generally

		eliminated from the final analysis. 1 because researchers were unable to calibrate his eye & other because his fixation times made him an extreme outlier.			advertisements. Among those participants who fixated at least one on an advertisement's warning message, only a relatively small percentage were able to recall its general concept or restate it verbatim in the masked recall test.	regarded as a more difficult & therefore less sensitive measure of memory than recognition. Future studies should consider using recognition measures as a follow-up to masked recall. **Comments** • Investigated whether adolescent readers attend to responsibility or moderation messages included in magazine advertisements for alcohol beverages & to assess the association between attention & ability to recall the content of these messages. • An integrated head-eye tracking system (ASL Eye-TRAC 6000) was used to measure the eye movements, including fixations & fixation duration of participants after they viewed 14 print advertisements, 6 of them were for alcoholic beverages & included a responsibility message. Immediately after the eye-tracking sessions, participants completed a masked-recall exercise. **Reported conclusions (by authors).** • Results indicate that when the responsibility message is a major element of the advertisement, or is incorporated as a major theme it is more likely to be seen by adolescent readers. • Voluntary responsibility or moderation messages failed to capture the attention of teenagers who participate in this study & need to be typographically modified to be more effective.

2.9. References: Review 2

Academy of Medical Sciences. (2004) *Calling Time. The Nation's Drinking as a Major Health Issue. A Report from the Academy of Medical Sciences .* Academy of Medical Sciences: London, 2004.

Aitken, P. P., Eadie, D. R., Leather, D., et al. (1988), TV advertisements for alcoholic drinks do reinforce under-age drinking, *British Journal of Addiction*, **83**, 1399-1419.

Anderson P, & Baumberg B (2006). *Alcohol in Europe: a public health perspective.* Institute of Alcohol Studies, London.

Anderson P (2007). *The Impact of Alcohol Advertising: ELSA project report on the evidence to strengthen regulation to protect young people*. Netherlands: (National Foundation for Alcohol Prevention in the Netherlands.

Babor TF, Mendelson JH, Greenberg I, Kuehnle J. (1978) Experimental analysis of the 'happy hour": effects of purchase price on alcohol consumption. *Psychopharmacology (Berl).* **58**(1):35–41.

Casiro O.G., Stanwick R.S., Pelech A. ,Taylor, V., Friesen, F., Fast, M., Peabody, D., Alto, L., Edye- Mazowita G, Dean, H, and Esquivel, A. **(**1994) Public awareness of the risks of drinking alcohol during pregnancy: The effects of a TV campaign. *Canadian Journal of Public Health* **85**, 23-27.

Casswell, S. and Gilmore, L. **(**1989) Evaluated community action project on alcohol. *Journal of Studies on Alcohol*, **50**, 339-346.

Casswell, S., Ranson, R. and Gilmore, L. **(**1990). Evaluation of a mass-media campaign for the primary prevention of alcohol-related problems. *Health Promotion International* **5** 9-17.

Casswell S, Maxwell A. (2005) Regulation of alcohol marketing: a global view. *J Public Health Policy.* **26**(3):343-58.

Connolly, G.M. and Casswell, S. and Zhang, J.F. and Silva, P.A. **(**1994) Alcohol in the mass media and drinking by adolescents: A longitudinal study. *Addiction* **89**: 12551263.

Fisher,M (2005) Happy hour economics, or how an increase in demand can produce a decrease in price, *Economic Review*, Federal Reserve Bank of Atlanta, issue Q 2, 25-34.

Furnham A, Ingle H , Gunter B , and McClelland A. (1997). A content analysis of alcohol portrayal and drinking in British TV soap operas. *Health Educ. Res*. **12**: 519-529.

Garfield, C.F., Chung, P.J. Rathouz P.J.. (2003) Alcohol Advertising in Magazines and Adolescent Readership. *Journal of the American Medical Association*, **289**, May 14, 2003, 2424-29.

Giesbrecht N., Conley P., Denniston R., Gliksman L., Holder H.D., Pederson A., Room R., and Shain M. (eds.) (1990). *Research, Action, and the Community: Experiences in the Prevention of Alcohol and Other Drug Problems*. Rockville, Maryland: Office for Substance Abuse Prevention.

Goodstadt M. and Flynn L. **(**1993) Protecting oneself and protecting others: refusing service, providing warnings, and other strategies for alcohol warnings. *Contemporary Drug Problems* **20**, 277-291

Gorman D.M. **(**1995) Are school-based resistance skills training programs effective in preventing alcohol abuse? *Journal of Alcohol and Drug Education* **41**, 74-98.

Greenfield T.K. and Zimmerman R. (eds.) 1993 *CSAP Prevention Monograph - 14: Second International Research Symposium on Experiences with Community Action Projects for the Prevention of Alcohol and Other Drug Problems.* Washington, US: Department of Health and Human Services.

Holder H.D. 1994) Mass communication as an essential aspect of community prevention to reduce alcohol-involved traffic crashes. *Alcohol, Drugs and Driving*, **10**, 3-4.

Holder, H.D. and Treno, A.J. **(**1997). Media advocacy in community prevention: news as a means to advance policy change. *Addiction* **92** S189-199.

Jernigan D, O'Hara J. (2004). Alcohol advertising and marketing. In: National Research Council and Institute of Medicine, *Reducing Underage Drinking: A Collective Responsibility*, RJ Bonnie and ME O'Connell, eds. (Washington DC: National Academies Press), 625-653.

Jernigan D, Ostroff J, Ross C. (2005) Alcohol advertising and youth: a measured approach. *J Public Health Policy*. **26**:312-325.

Jones, S.C. and Donovan, R.J. (2002) Self-regulation of Alcohol Advertising: is it working for Australia, *Journal of Public Affairs*, **2**(3), 153-165.
Kohn, P.M. & Smart, R.G. (1984) The impact of TV advertising on alcohol consumption: An experiment. *Journal of Studies on Alcohol* **45**: 295-301
National Committee for the Review of Alcohol Advertising. (2003) *Review of the Self-Regulatory System for Alcohol Advertising,* State Government of Victoria, Department of Human Services, Melbourne.
Nelson, J.P. (1999) Broadcast advertising and US demand for alcoholic beverages. *Southern Economic Journal* **65**: 771-790
Saunders, B (1993) Guarding the guardians: influencing the regulation of alcohol promotions in Australia. *Addiction* **88** (s1) , 43S–51S
Smart. R.G. (1988) Does alcohol advertising affect overall consumption? A review of empirical Studies. *Journal of Studies on Alcohol* 49: 314-323.
Stewart K. **(**1997) Environmentally oriented alcohol prevention policies for young adults. In: *Substance Abuse and Mental Health Services Administration*, Center for Substance Abuse Prevention, Secretary's Youth Substance Abuse Prevention Initiative: Resource papers. Pre- publication documents, 107–157. Rockville, MD: Author.
Stockwell, T. and Single, E. 1997. Standard unit labelling of alcohol containers. In Plant, M., E. Single and T. Stockwell (Eds). *Alcohol: Minimizing the harm. What works.* London: Free Association Books.
Strickland, D.E. 1983: Advertising exposure, alcohol consumption, and misuse of alcohol. In: Grant, M. & Plant, M. & Williams, A. (eds.): *Economics and alcohol: consumption and controls* (201-222). New York: Gardner Press Inc.
Swire, P.P 1997 Markets, Self-Regulation, and Government Enforcement. In *Privacy And Self-Regulation In The Information Age* NTIA 1997.
Thomsen, S.R. and Rekve, D. 2004. TV and drinking expectancies. *Nordic Studies on Alcohol. and Drugs* **21** 17-28
Wallack, L., Dorfman, L., Jernigan, D. and Themba, M. 1993: *Media advocacy and public health – power for prevention.* Newbury Park, CA: Sage.

2.10 Included Studies: Review 2

Atkin, C., Neuendorf, K., & McDermott, S. (1983), The role of alcohol advertising in excessive and hazardous drinking, *Journal of Drug Education*, **13**, 313-323.
Austin, E. W., Chen, M., & Grube, J. W. (2006), How does alcohol advertising influence underage drinking? The role of desirability, identification and skepticism, *Journal of Adolescent Health,* **38**, 4, 376-384.
Austin, E. W., Miller, A. C. R., Silva, J., Guerra, P., Geisler, N., Gamboa, L., Phakakayai, O., & Kuechle, B. (2002), The effects of increased cognitive involvement on college students' interpretations of magazine advertisements for alcohol, Communication Research, **29**, 2, 155-179.
Bray JW, Loomis BR and Engelen M. (2007) You Save Money When You Buy in Bulk: Does Volume-Based Pricing Cause People to Buy More Beer? *RTI International.* May 24, 2007. http://www.econ.duke.edu/~staff/2007-08Papers/Bray.pdf
Calfee, J. E. & Scherega, C. 1994, The influence of advertising on alcohol consumption: a literature review and an econometric analysis of four European nations, *International Journal of Advertising*, **13**, 287-310.
Casswell, S. & Zhang, J.-F. 1998, Impact of liking for advertising and brand allegiance on drinking and alcohol-related aggression: A longitudinal study, *Addiction*, **93**, 1209-1217.
Casswell, S., Pledger, M., & Pratap, S. (2002), Trajectories of drinking from 18 to 26 years: identification and prediction, *Addiction*, **97**, 1427-1437.
Center on Alcohol Marketing and Youth (2003), *Exposure of African-American Youth to Alcohol Advertising,* Report: ED477966.16Jun.
Center on Alcohol Marketing and Youth (2003), *Exposure of Hispanic Youth to Alcohol Advertising,* Report: ED477967.18 Apr .
Chen, M. J., Grube, J. W., Bersamin, M., Waiters, E., & Keefe, D. B. (2005), Alcohol advertising: What makes it attractive to youth?, *Journal of Health Communication*, **10**, 6, 553-565.

Christie, J., Fisher, D., Kozup, J. C., Smith, S., Burton, S., & Creyer, E. H. (2001), The effects of bar-sponsored alcohol beverage promotions across binge and nonbinge drinkers, *Journal of Public Policy & Marketing*, **20**, 2, 240-253.

Clapp, J. D., Sillington, A. M., & Heidt, L. (2000), Continuing education. Student perceptions of alcohol promotion on campus, *Journal of Health Education*, **31**, 5, 252-253.

Collins, R. L., Ellickson, P. L., McCaffrey, D., & Hambarsoomians, K. (2007), Early adolescent exposure to alcohol advertising and its relationship to underage drinking, Journal of Adolescent Health, **40**, 6, 527-534.

Collins, R. L., Schell, T., Ellickson, P. L., & McCaffrey, D. (2003), Predictors of beer advertising awareness among eighth graders, *Addiction*, 98, 9, 1297-1306.

Connolly, G., Casswell, S., & Zhang, J. F. (1994), Alcohol in the mass media and drinking by adolescents: A longitudinal study, *Addiction*, **89**, 1255-1263.

Copeland, J., Stevenson, R. J., Gates, P., & Dillon, P. (2007), Young Australians and alcohol: The acceptablity of ready-to-drink (RTD) alcoholic beverages among 12-30-year-olds. , *Addiction*, **102**, 11, 1740-1746.

Dorsett, J. & Dickerson, S. (2004), Advertising and alcohol consumption in the UK, *International Journal of Advertising*, **23**, 2, 149-171.

Dring, C. & Hope, A. (2001), *The impact of alcohol advertising on teenagers in Ireland,* Health Promotion Unit, Department of Health and Children.

Duffy, M. (2003), Advertising and Food, Drink and Tobacco Consumption in the United Kingdom: A Dynamic Demand System, *Agricultural Economics*, **28**, 1, 51-70.

Ellickson, P. L., Collins, R. L., Hambarsoomians, K., & McCaffrey, D. F. (2005), Does alcohol advertising promote adolescent drinking? Results from a longitudinal assessment, *Addiction*, **100**, 2, 235-246.

Fisher, L. B., Miles, I. W., Austin, S. B., Camargo, C. A., Jr., Colditz, G. A., Fisher, L. B., Miles, I. W., Austin, S. B., Camargo, C. A. J., & Colditz, G. A. (2007), Predictors of initiation of alcohol use among US adolescents: findings from a prospective cohort study, *Archives of Pediatrics & Adolescent Medicine*, **161**, 10, 959-966.

Fleming, K., Thorson, E., & Atkin, C. K. (2004), Alcohol advertising exposure and perceptions: Links with alcohol expectancies and intentions to drink or drinking in underaged youth and young adults, *Journal of Health Communication*, 9, 1, 3-29.

Gallet, C. A. (2007), The Demand for Alcohol: A Meta-analysis of Elasticities, *Australian Journal of Agricultural and Resource Economics*, 51, 2, 121-135.

Garretson, J. A. & Bruton, S. (1998), Alcoholic beverage sales promotion: An initial investigation of the role of warning messages and brand characters among consumers over and under the legal drinking age, *Journal of Public Policy & Marketing,* 17, 35-47.

Gentile, D. A., Walsh, D. A., Bloomgren, B. W., Jr., Jule, A., & Norman, J. A. 2001, *Frogs Sell Beer: The Effects of Beer Advertisements on Adolescent Drinking Knowledge, Attitudes, and Behavior,* Report: ED461777.17Apr 2001.

Gill, J., O'May, F., 2007, Practical demonstration of personal daily consumption limits: a useful intervention tool to promote responsible drinking among UK adults?, *Alcohol & Alcoholism,* **42**, 5, 436-441.

Hastings G, Anderson S, Cooke E, Gordon R. Alcohol marketing and young people's drinking: A review of the research. J Public Health Policy 2005;26: 296-311.

Henriksen, L., Feighery, E. C., Schleicher, N. C., & Fortmann, S. P. (2008), Receptivity to alcohol marketing predicts initiation of alcohol use, *Journal of Adolescent Health*, **42**, 1, 28-35.

Hurtz, S. Q., Henriksen, L., Wang, Y., Feighery, E. C., & Fortmann, S. P. (2007), The relationship between exposure to alcohol advertising in stores, owning alcohol promotional items, and adolescent alcohol use, *Alcohol and Alcoholism*, **42**, 2, 143-149.

Jernigan (2004), Sex differences in adolescent exposure to alcohol advertising in magazines, *Archives of Pediatrics & Adolescent Medicine*, **158**, 9, p. 929.

Kelly, K. & Edwards, R. 1998, Image advertisements for alcohol products: Is their appeal associated with adolescents' intention to consume alcohol?, *Adolescence*, 33, 47-59.

Kuo, M. C., Wechsler, H., Greenberg, P., & Lee, H. (2003), The marketing of alcohol to college students - The role of low prices and special promotions, *American Journal of Preventive Medicine,* **25**, 3, 204-211.

Lipsitz, A., Brake, G., Vincent, E. J., & et, a. (1993), Another round for the brewers: TV ads and children's alcohol expectancies, *Journal of Applied Social Psychology*, **23,** 439-450.

Makowsky, C.R.; Whitehead, P.C. (1991) Advertising and alcohol sales: A legal impact study. *Journal of Studies on Alcohol*, **52**(6):555-567.

Mastro, D. E. & Atkin, C. (2002), Exposure to alcohol billboards and beliefs and attitudes toward drinking among Mexican American high school students, *Howard Journal of Communications*, **13**, 2, 129-151.

McCreanor, T., Barnes, H. M., Gregory, M., Kaiwai, H., & Borell, S. (2005), Consuming identities: Alcohol marketing and the commodification of youth experience, *Addiction Research & Theory*, 13, 6, 579-590.

Nelson, J. P. (2003), Advertising bans, monopoly, and alcohol demand: Testing for substitution effects using state panel data, *Review of Industrial Organization*, 22, 1, 1-25.

Nelson, J. P. & Young, D. J. (2001), Do advertising bans work? An international comparison, *International Journal of Advertising,* 20, 273-296.

Nelson, P. & Moran, J. R. (1995), Advertising and US alcohol beverage demand: System-wide estimates, *Applied Economics*, 27, 273-296.

Ofcom (2005), *Young people and alcohol advertising: An investigation of alcohol advertising prior to the advertising code changes* , Office of Communications.

Ofcom (2007), *Young people and alcohol advertising: An investigation of alcohol advertising following changes to the advertising code*, Office of Communications.

Pasch, K. E., Komro, K. A., Perry, C. L., Hearst, M. O., Farbakhsh, K., Pasch, K. E., Komro, K. A., Perry, C. L., Hearst, M. O., & Farbakhsh, K. (2007), Outdoor alcohol advertising near schools: what does it advertise and how is it related to intentions and use of alcohol among young adolescents?, *Journal of Studies on Alcohol*, **68,** 4, 587-596.

Pedersen, P. J. (2002), The Influence of Alcohol Advertising on Students' Drinking Behaviors, *NASPA Journal*; **40** 1.

Robinson, T. N., Chen, H. L., & Killen, J. D. (1998), TV and music video exposure and risk of adolescent alcohol use, *Pediatrics*, **102**, 5, p. e54.

Saffer, H. (1991), Alcohol advertising bands and alcohol abuse: An international perspective, *Journal of Health Economics*, **10**, 65-79.

Saffer, H. (1996). Studying the effects of alcohol advertising on consumption. Alcohol Health and Research World, **20**, 266-272.

Saffer, H. (1997), Alcohol advertising and motor vehicle fatalities, *Review of Economics and Statistics*, **79**, 431-442.

Saffer, H. (2002) Alcohol advertising and youth. *Journal of Studies on Alcohol* (Suppl. 14):173–181.

Saffer, H. & Dave, D. (2002), Alcohol consumption and alcohol advertising bans, *Applied Economics*, **34**, 11, 1325-1334.

Saffer, H. & Dave, D. (2003), *Alcohol Advertising and Alcohol Consumption by Adolescents*, National Bureau of Economic Research, Inc, NBER Working Papers: 9676.2003.

Saffer, H. & Dave, D. (2006), Alcohol advertising and alcohol consumption by adolescents, *Health Economics*, **15**, 6, 617-637.

Sargent, J. D., Wills, T. A., Stoolmiller, M., Gibson, J., & Gibbons, F. X. (2006), Alcohol use in motion pictures and its relation with early-onset teen drinking, *J Stud Alcohol*, **67**, 1, 54-65.

Seldon, B. J. (2000), Media Substitution and Economies of Scale in Advertising, *International Journal of Industrial Organization*, **18**, 8, 1153-1180.

Smith, A., Edwards, C., & Harris, W. (2005), Bottleshops and 'ready-to-drink' alcoholic beverages, *Health Promotion Journal of Australia*, 16, 1, 32-36.

Smith LA & Foxcroft DR. (2007) *The effect of alcohol advertising and marketing on drinking behaviour in young people: A systematic review. Final report.* Alcohol Education and Research Council, November 2007

Snyder, L. B., Milici, F. F., Slater, M., Sun, H., & Strizhakova, Y. (2006), Effects of alcohol advertising exposure on drinking among youth, *Archives of Pediatrics & Adolescent Medicine,* **160**, 1, 18-24.

Stacy, A. W., Zogg, J. B., Unger, J. B., & Dent, C. W. (2004), Exposure to televised alcohol ads and subsequent adolescent alcohol use, *American Journal of Health Behavior*, **28**, 6, 498-509.

Tremblay, V. J. & Okuyama, K. (2001), Advertising restrictions, competition, and alcohol consumption, *Contemporary Economic Policy*, **19**, 3, 313-321.

Unger, J. B., Schuster, D., Zogg, J., Dent, C. W., & Stacy, A. W. (2003), Alcohol advertising exposure and adolescent alcohol use: A comparison of exposure measures, *Addiction Research & Theory,* **11**, 3, 177-193.

van den Bulck, J. & Beullens, K. (2005), TV and music video exposure and adolescent alcohol use while going out, *Alcohol and Alcoholism*, 40, 3, 249-253.

Workman, J. E. (2003), Alcohol Promotional Clothing Items and Alcohol Use by Underage Consumers. , *Family & Consumer Sciences Research Journal,* **31**, 3, 331-354.

Workman, J. E. (2004), Alcohol Promotional Clothing Items and Alcohol Use by University Students. , *Analyses of Social Issues and Public Policy (ASAP),* **4**, 1, 69-89.

Yang, S. & Raghubir, P. (2005), Can bottles speak volumes? The effect of package shape on how much to buy. , *Journal of Retailing*, **81**, 4, 269-281.

Zogg, J. B., Ma, H., Dent, C. W., & Stacy, A. W. (2004), Self-generated alcohol outcomes in 8th and 10th graders: Exposure to vicarious sources of alcohol information. , *Addictive Behaviors*, **29**, 1, 3-16.

Zwarun, L., Linz, D., Metzger, M., & Kunkel, D. (2006), Effects of Showing Risk in Beer Commercials to Young Drinkers. , *Journal of Broadcasting & Electronic Media*, **50**, 1, 52-77.

Review 3: The effect of alcohol consumption on alcohol related harm

3.1 Alcohol consumption and health consequences

Alcohol consumption is related to a wide variety of negative health outcomes including morbidity, mortality, and disability (Rehm et al. 2003). Research on alcohol–related morbidity and mortality takes into account the varying effects of overall alcohol consumption and different drinking patterns. The results from this epidemiological research indicate that alcohol use increases the risk for many chronic health consequences (e.g., diseases) and acute consequences (e.g., traffic crashes), but a certain pattern of regular light–to–moderate drinking may have beneficial effects on coronary heart disease. Gutjahr and Gmel (2001) examined three major social cost studies to produce a state of the art list of alcohol-related fatal medical conditions for which causal evidence exists. This list has been fairly stable over the ensuing decade and a broad general consensus exists regarding both long-term conditions and acute effects. The evidence is more equivocal, however, where it relates to the optimal and harmful levels of consumption and the duration of exposure for irreversible harm to be effected.

The overview by Rehm et al (2003) used published meta-analyses to establish the relationship of alcohol consumption to burden of disease for over 60 conditions. The following review seeks to add the findings from systematic reviews and meta-analyses conducted from 2001 onwards to those from this previous review.

The emphasis is on examining whether findings from this previous review have been confirmed, strengthened or possibly overturned. This review examines the nature of possible causative links between consumption and harm. It should therefore be read in conjunction with Review 1 and Review 2, which attempt to link pricing and promotion to consumption and to establish a direct link between pricing/promotion and harm.

Table 14 Disease conditions that are by definition alcohol-related (Alcohol-attributable fraction = 1) and recent meta-analytic findings

ICD-9	Disease	Meta-analysis	Findings
291	Alcoholic psychoses	NA	NA
303	Alcohol dependence syndrome	Cargiulo (2007)	Consistent and substantial comorbidity between alcohol dependence and other psychiatric conditions especially mood and anxiety disorders and drug abuse.
305.0	Alcohol abuse	NA	NA
357.5	Alcoholic polyneuropathy	NA	NA
425.5	Alcoholic cardiomyopathy	NA	NA
535.3	Alcoholic gastritis	NA	NA
571.0	Alcoholic fatty liver	NA	NA
571.1	Acute alcoholic hepatitis	Li (2008)	Observed in chronic alcoholics (with or without noticeable liver impairments) and in moderate drinkers after a binge.
571.2	Alcoholic cirrhosis of liver	NA	NA
571.3	Alcoholic liver damage, unspecific	Li (2008)	Risk of future liver disease increased significantly for men who consumed 28-41 drinks per week and for women who consumed 14-27 drinks per week.
655.4	Foetal alcohol syndrome	Eustace et al (2003)	Consumption of alcohol during pregnancy can harm foetus irreparably. Consumption of 7 standard drinks per week may be threshold for most sensitive neurobehavioral changes but not all women and infants are affected equally.
		Henderson et al, (2007b)	No convincing effects of binge drinking on a range of adverse outcomes including fetal alcohol syndrome and neurodevelopmental effects. Possible effect on neurodevelopmental outcome but further research required. Many studies had methodological weaknesses.
790.3	Excess blood alcohol	NA	NA
980.0, 980.1	Ethanol and methanol toxicity	NA	NA

Note. NA = not available

Table 155 Chronic alcohol-related health effects (non-neoplastic conditions) identified by various meta-analyses

Disease	ICD-9	Deaths England and Wales 1997 (White et al, 2004)	Effect according to Rehm et al, 2003	Recent Meta-analyses	Findings
Diabetes	250	*Inadequate evidence of causality. (Contested)*	Mainly beneficial	Howard et al (2004)	Moderate alcohol consumption associated with decreased incidence of diabetes and decreased incidence of heart disease in persons with diabetes. Compared with no alcohol use, moderate consumption (one to 3 drinks/d) is associated with 33% to 56% lower incidence of diabetes and 34% to 55% lower incidence of diabetes-related coronary heart disease. Compared with moderate consumption, heavy consumption (>3 drinks/d) may be associated with up to a 43% increased incidence of diabetes. Moderate alcohol consumption does not acutely impair glycemic control in persons with diabetes
				Koppes et al (2006)	Total mortality (RR=0.64; 95% CI 0.49-0.82) in <6g/daycategory. In higher alcohol consumption categories RRs of total mortality were not significant.
Unipolar major depression	300.4	*Meta-analyses not possible due to difficulty in attributing alcohol related risk*	Detrimental	Sullivan et al (2005)	Four observational studies found a current or lifetime problem was associated with increased risk of suicide ideation or attempt. only two were statistically significant. Two of 6 studies reported an increased risk of relapse and decreased likelihood of recovery.. Patients with lifetime alcohol problems were 25% more likely to be readmitted to hospital for depression (25% v 0%)
Epilepsy	**345**	**No data**	**Detrimental**	**NA**	**NA**
Heart failure	428–429	*Unspecific category with no identification of underlying pathology.*	*Unidentifiable*	NA	NA
Stroke	**430–438**	***Haemorrhagic stroke =7067 Ischaemic***	**Beneficial or detrimental, depending**	Reynolds et al (2003)	Consumption of more than 60 g/day associated with increased risk of total stroke,

		stroke = 50641	**on type of stroke and average volume of consumption**		RR=1.64 (1.39-1.93); ischemic stroke, 1.69 (1.34-2.15); and hemorrhagic stroke, 2.18 (1.48-3.20). Consumption of less than 12 g/day associated with reduced risk of total stroke, RR=0.83 (0.75-0.91) and ischaemic stroke, 0.80 (0.67-0.96). Consumption of 12-24 g/day associated with reduced risk of ischaemic stroke, RR=0.72 (0.57-0.91).
				Corrao et al (2004)	Significant increased risk at 100g/day for ischaemic stroke RR=4.37 (2.28-8.37). and at 50g/day for haemorrhagic stroke RR=1.82 (1.46-2.28).
Oesophageal varices	**456.0–456.2**	***Not based on meta-analyses.***	**Detrimental**	**NA**	**NA**
Gastro-oesophageal haemorrhage	**530.7**	***Not based on meta-analyses but clinically documented***	**Detrimental**	**NA**	**NA**
Liver cirrhosis	**571.0–571.9**	**2346**	**Detrimental**	Norström & Ramstedt (2005)	A one litre increase in per capita consumption was associated with a statistically significant 12% increase in male cirrhosis and 8% in female cirrhosis.
				Corrao et al (2004)	Direct trend in risk starting from 25g/day (RR= 2.90 (2.71-3.09).
Cholelithiasis	**574**	**No data**	**Beneficial**		
Acute pancreatitis	**577.0**	**No data**	**Detrimental**		
Chronic pancreatitis	**577.1**	**74**	**Detrimental**	Corrao et al (2004)	
Spontaneous abortion	**634**	***Applies to fraction of females with alcohol consumption during pregnancy***	**Detrimental**	Henderson et al (2007a)	No convincing evidence of adverse effects of prenatal alcohol exposure at low-moderate levels of exposure. Weaknesses in evidence preclude conclusion that drinking at these levels during pregnancy is safe.
				Henderson et al (2007b)	No convincing effects of binge drinking on a range of adverse outcomes including miscarriage and stillbirth. Many studies had methodological weaknesses.
Low birth weight	**656.5**	***Applies to fraction of females with alcohol consumption during***	**Detrimental**	Henderson et al (2007a)	No convincing evidence of adverse effects of prenatal alcohol exposure at low-moderate levels of exposure. Weaknesses in evidence preclude conclusion that

		pregnancy			drinking at these levels during pregnancy is safe.
				Henderson et al (2007b)	No convincing effects of binge drinking on a range of adverse outcomes including low birthweight and small for gestational age at birth. Many studies had methodological weaknesses.
Psoriasis	**696.1**	**No data**	**Detrimental**	**NA**	**NA**
Prematurity	764	*Inadequate evidence for causation of alcohol during pregnancy.*	Detrimental	Henderson et al (2007a)	No convincing evidence of adverse effects of prenatal alcohol exposure at low-moderate levels of exposure. Weaknesses in evidence preclude conclusion that drinking at these levels during pregnancy is safe.
				Henderson et al (2007b)	No convincing effects of binge drinking on a range of adverse outcomes including prematurity. Many studies had methodological weaknesses.
Intrauterine growth-retardation	765	*Inadequate evidence for causation of alcohol during pregnancy.*	Detrimental	Henderson et al (2007a)	No convincing evidence of adverse effects of prenatal alcohol exposure at low-moderate levels of exposure. Weaknesses in evidence preclude conclusion that drinking at these levels during pregnancy is safe.
				Henderson et al (2007b)	No convincing effects of binge drinking on intrauterine growth restriction. Many studies had methodological weaknesses.

Rows in bold indicate conditions for which the recent literature has been consistent in concluding sufficient evidence for a causal relationship (Rehm et al, 2003).

Acute conditions where alcohol is a contributory cause

With respect to acute conditions, most researchers agree on causality (but see Gmel & Rehm 2003) and the conditions listed in Table 15 are traditionally included.

Table 16 Acute conditions with alcohol as a contributory factor

Condition	*Meta-analysis*	*Findings*
Injuries from falls (E880-888)	Borges et al (2006)	Estimated pooled relative risk for those reporting alcohol use within 6 hours prior to injury was 5.69 (95% CI = 4.04-8.00). However no UK data included.
	Corrao et al (2004)	Direct trend in risk starting from 25g/day (RR= 1.12 (1.06-1.18)
Fires (E890-899)	Taylor & Rehm (2006)	Interaction of smoking and alcohol may increase risk for fire injury. Not many high quality studies due to low sample sizes.
Excessive cold (E901);	NA	NA
Drowning (E910);	NA	NA
Occupational and machine injuries (E919-920);	NA	NA
Suicide (E950-959);	Cargiulo (2007)	Alcohol dependence associated with increased risks of suicide (OR 2.13 95% CI 1.18-3.85) and suicide attempts (OR 2.50 95% CI 1.38-4.52)
	Norström et al (2005)	
	Wilcox et al (2004)	Overall SMR for heavy drinking was 351 (95% CI 251-478) while it was 39 (95% CI 5-140) for males
Assault (E960-966, E968)	Corrao et al (2004)	Direct trend in risk starting from 25g/day (RR= 1.12 (1.06-1.18)
Child abuse (E967).	NA	NA

3.1.1 Alcohol and all-cause mortality

All of these studies consider the likely effect of alcohol on all-cause mortality. A narrative synthesis is preferred here because studies use different consumption metrics over different time periods (e.g. daily, weekly, average drinking). This review includes systematic reviews and individual studies conducted in a UK setting.

Details of studies

Five studies met the inclusion criteria. All studies were published in English between 2002 and 2006. Two of these studies were specifically conducted using data from England and Wales (White et al, 2002; White et al, 2004).

Outcomes

All studies measured all-cause mortality.

Results

Recent reviews tend to focus not on the effects of alcohol consumption *per se* but rather on the differential effects of different patterns and volumes of consumption. All studies identified a beneficial effect from low levels of alcohol drinking which was reversed to a detrimental effect at higher levels of consumption. The threshold for this increased level of risk varies according to the specific research question and the choice of measurement units.

White and colleagues (2002) examined the relationship between alcohol consumption and risk of death using published systematic reviews and population data from England and Wales. They identified a direct dose-response relation between alcohol consumption and risk of death in women aged 16-54 and in men aged 16-34. Risk increases by 5% above the minimum at 8 units per week in women aged 16-24 and 5 units a week in men aged 16-24, increasing to 20 and 34 units a week in women aged over 65 and men aged over 65 respectively. They thus concluded that substantially increased risks of all-cause mortality can occur even in people drinking lower than recommended limits, and especially among younger people.

A subsequent study by the same authors (White et al, 2004) examined mortality attributable to different levels in addition to all-cause mortality for England and Wales in 1997. In particular the authors examined any drinking; drinking above the nadir (level of alcohol consumption carrying the lowest risk); and drinking more than the British Royal Colleges' recommended limits of 21 units/week in men and 14 units/week in women. They found that deaths from ischaemic heart disease prevented by alcohol consumption (11 276 in men, 4050 in women) roughly balanced other deaths attributable to alcohol consumption (9246 in men, 4216 in women). Data on the implications of different drinking levels is presented below. The authors concluded that drinking above recommended limits remains responsible for many deaths and a large loss of person-years of life.

Table 16 Percentages of deaths at different drinking levels (England & Wales)

Level	*Males – Percentages of Deaths (95% CI)*	*Females – Percentages of Deaths (95% CI)*
Any drinking	0.8% (0.2%-1.3%)	0.1% (-0.3%-0.4%).
Drinking more than recommended limit	2.1% (1.9-2.3%)	0.8% (0.6-1.0%)
Drinking above nadir[a]	2.8%	1.2%

[a]Level of alcohol carrying the lowest risk

Table 17 Person-years of life lost to age 65 (England & Wales)

Level	*Males – Person-Years of life lost to age 65*	*Females – Person-Years of life lost to age 65*
Any drinking	10.3%	5.6%
Drinking more than recommended limit	8.5%	4.0%
Drinking above nadir[a]	12.6%	6.0%

[a]Level of alcohol carrying the lowest risk

Castelnuovo et al (2006) identified thirty-four studies that they synthesised in a meta-analysis that included 1,015,835 subjects and 94,533 deaths. They report the widely-reported J-shaped relationship

between alcohol and total mortality. Whereas consumption of up to 4 drinks per day in men and 2 drinks per day in women was inversely associated with total mortality higher doses of alcohol were associated with increased mortality. Importantly they discovered that the protective effect of low levels of alcohol disappeared at a lower level in women than in men. It should be recognised, however, that reduction of all-cause mortality is a crude measure of health benefit and fails to capture the wide range of health outcomes that need to be considered by policy-makers.

Only three of the cohort studies used by Castelnuovo and colleagues (2006) were derived from observations made in England (Britton and Marmot, 2004; Doll et al, 2005; and Wannamethee and Shaper, 1999). The youngest age included in these studies was 35 (Britton and Marmot, 2004) and this same study was the only one to include both male and female subjects. It is therefore worth recording that it is problematic to link these data to several of the priority groups that are the focus of the current reviews. Furthermore, this meta-analysis grouped all European studies together in its sub-analysis thereby potentially obscuring the beneficial effects of the Mediterranean diet against the observations of these three studies.

Burger et al (2004) attempted to weigh the risks of moderate alcohol consumption against its benefits and included all-cause mortality amongst outcomes examined. They evaluated over 350 studies although much smaller subsets of studies were used to examine each individual outcome. Twenty-seven prospective studies were used to examine all-cause mortality in adults of 40 or more years of age. They identified a maximum risk reduction in men at 19g/day and in women at 10g/day (roughly equivalent to 2.2 and 1.2 UK alcohol unit, respectively).

Limitations

A number of authors (San Jose 2003, Fillmore et al, 2006, Harriss et al, 2007) highlight a consistent methodological problem across studies in relation to the composition of groups identified as “abstainers”. Those drinking are more likely to abstain from drinking in the presence of disease. These “sick-quitters” are typically included with those who never drank and artificially inflate the health risk among abstainers by bringing their already elevated health risk with them when moving into the abstainers category. The abstainer category is then typically used as the reference group with which those with moderate consumption are compared. Fillmore et al (2006)’s meta-analysis compares the effect sizes of studies that do and do not include former and occasional drinkers in the abstention category. In the “error-free” studies, the protective effect of moderate consumption (i.e. no J-shaped curve) is not observed. See also the “Limitations” paragraph in the section on coronary heart disease.

Increasingly, too, it is drinking patterns, not merely average alcohol intake, that are found to determine alcohol mortality. Although there are several constituent UK studies none cover the particular policy priority groups targeted by this review.

Evidence statement 13: There is consistent evidence to suggest that alcohol consumption is associated with substantially increased risks of all-cause mortality even in people drinking lower than recommended limits, and especially among younger people. . High levels of alcohol consumption have detrimental effects. The evidence is more equivocal, however, where it relates to establishing cut-off points for lower risk versus harmful levels of consumption. There is an ongoing controversy as to whether or not there are beneficial (cardio-protective) effects at low levels of alcohol consumption.

Table 189 Relationship between alcohol consumption and all-cause mortality

Condition	*Meta-analysis*	*Findings*
All-cause mortality	White et al (2002)	Direct dose-response relation between alcohol consumption and risk of death in women aged 16-54 and in men aged 16-34. Risk increases by 5% above minimum at 8 units in women aged 16-24 and 5 units a week in men aged 16-24, increasing to 20 and 34 units a week in women and men aged over 65 respectively. Substantially increased risks of all-cause mortality can occur even in people drinking lower than recommended limits, especially younger people.
	White et al (2004)	Deaths from ischaemic heart disease prevented by alcohol consumption (11 276 in men, 4050 in women) roughly balanced other deaths attributable to alcohol consumption (9246 in men, 4216 in women). Drinking above recommended limits is responsible for many deaths and a large loss of person-years of life.
	Burger et al (2004)	Maximum risk reduction in men at 19g/day and in women at 10g/day.
	Castelnuovo et al (2006)	Confirms widely-reported J-shaped relationship between alcohol and total mortality. Consumption of up to 4 drinks per day in men and 2 drinks per day in women was inversely associated with total mortality. Higher doses of alcohol associated with increased mortality. Protective effect of low levels of alcohol disappeared at lower level in women than in men.
	Fillmore et al (2006)	Find that protective effect of alcohol at moderate consumption levels compared to abstainers is dependent on how the “abstainers category” is defined. Protective effects were not found when moderate drinkers were compared to “true abstainers” rather than groups of abstainers which included former drinkers.

3.1.2 Coronary heart disease

Coronary heart disease (CHD) is a major cause of disease burden and of mortality around the world. It has therefore figured prominently in discussions of alcohol-related harm. This situation is complicated by the complex relationship between alcohol and coronary heart disease.

Rehm et al (2003) identified seven meta-analyses that examined the association between alcohol consumption and risk of coronary heart disease. He concluded that patterns of drinking must be included in the analysis. He was unable to perform his own meta-analysis because of the heterogeneity of reviews. Light to moderate consumption has been consistently shown to be linked to favourable CHD outcomes. In contrast, episodes of heavy drinking, even where linked to average light or moderate consumption, have been shown to relate to increased CHD risk (Rehm et al, 2003). There is an increased understanding of how this beneficial effect of light to moderate drinking may operate. Explanations include favourable lipid profiles (especially increased high-density lipoproteins and favourable coagulation profiles (Rimm et al, 1999). Other mechanisms have been suggested but none commands such prominence as the two identified above.

Details of studies
Our review identified three further meta-analyses of coronary heart disease, performed by Corrao et al (2004), Burger et al (2004) and Iestra et al (2005). Corrao et al (2004) selected 28 cohort studies from an initial pool of 51 studies. All included studies were published in English between 1966 and 1998. Burger et al (2004) found 18 studies that met quality criteria and used them to evaluate the risk association of alcohol consumption for CHD.

Outcomes
Studies typically measured the relative risk of coronary heart disease.

Results
Corrao et al (2004) found a statistically significant protective effect at doses of 25g/day (0.81 (95% CI 0.79-0.83)) and 50g/day (0.87 (95% CI 0.84-0.90)). However at a dose of 100g/day the effect became detrimental (1.13 (95% CI 1.06-1.21)).

Burger et al (2004), examining 18 studies that evaluate the association between consumption of alcohol and risk of CHD, present a uniform finding that alcohol consumption of less than 14g/day is associated with beneficial effects on CHD when compared with non-drinking. Risk reduction was most pronounced for women drinking 14–29 g alcohol/day and for men drinking 29–43 g alcohol/day, with a generally smaller benefit or no benefit at all for those drinking more. The most obvious beneficial health effect of alcohol consumption was observed for persons aged 50 years and older.

Whereas most of these studies examine the evidence for the general population, Iestra et al (2005) has looked at the effects of alcohol on those already diagnosed as having coronary artery disease (CAD). CAD patients differ from the general population primarily being older and undergoing treatment with preventive drugs. This review sought to identify prospective cohort studies and randomized controlled trials of patients with established CAD that report all-cause mortality and have at least 6 months follow-up. Relative risks (RR) for moderate alcohol use (RR, 0.80; 95% CI, 0.78 to 0.83) were identified.

Limitations
Systematic error in the definition of abstainers in previous studies (typically combining non-drinkers, former drinkers and light occasional drinkers) might explain much of the cardio-protective effect (Fillmore et al, 2006; Harriss et al 2007). Beyond the question of whether there is a relationship, there is the question of the size of the effect, which is much overestimated in the calculations which have been standard. When Swedish researchers used standard calculations in a cost-of-illness study, they found that 42% of the women being "saved" were aged 80 and over (Johansson et al 2006) The result arises because most CHD deaths are among the very old, while prospective studies on which Relative Risks typically follow people in their 40s or 50s. Jackson et al (2005) are also sceptical about the size of the effect, particularly at low drinking levels. A newly published meta-analysis (Djoussé and Gaziano 2008) identified as the final report was being written (and hence not appraised) finds that drinking patterns and genetic factors may explain some of the variation around this topic.

Summary
A WHO Expert Committee on Problems Related to Alcohol Consumption met (2006) to review public health problems attributable to alcohol consumption. They concluded that "even in societies where heart disease is a very important cause of death, the overall number of lost years of life attributable to drinking outweighs the saved years attributable to protective effects".

Evidence statement 14: There is moderate, but methodologically disputed, evidence to suggest that light alcohol consumption is associated with a decreased level of risk from coronary heart disease. High levels of alcohol consumption (defined here as 100g/day) have detrimental effects (RR = 1.13 (95% CI 1.06-1.21)).

Table 19 Relationship between alcohol consumption and coronary risk factors

Hypertension	**401–405**	**3084**	**Detrimental, seems to depend on patterns of drinking for low volume**	Corrao et al (2004)	Direct trend in risk starting from 25g/day (RR= 1.43 (1.33-1.53)
Coronary (ischaemic) heart disease	**410–414**	**122425**	**Beneficial for moderate drinking or detrimental for heavy drinking**	Iestra et al (2005)	4 of 5 cohort studies found statistically significant reduction of all causes mortality between 15% and 25% for moderate drinking. RR for all-cause mortality was 0.80; (0.78 to 0.83)
				Corrao et al (2004)	Lower death rates among moderate drinkers with established CHD. Reasonable mechanisms for causal role exist. Significant increased risk for 100g/day (RR= 1.13 (1.06-1.21)
Cardiac arrhythmias	**427.0, 427.2, 427.3**	**No data**	**Detrimental**	**NA**	**NA**

3.1.3 Stroke

Rehm (2003) identified seven meta-analyses that examined the association between alcohol consumption and risk of stroke. He identified important differences in risk in terms of type of stroke and average volume of consumption. He was unable to perform his own meta-analysis because of the heterogeneity of reviews.

Details of studies
Our review identified one further meta-analysis of stroke, performed by Reynolds et al (2003). This examined a total of 35 observational studies (19 cohort and 16 case-control studies). All included studies were published in English between 1966 and April 2002. Included populations were categorised according to average alcohol intake of less than 12g/day; 12-24g/day; 24-60g/day and over 60g/day.

Outcomes
Included studies measured occurrence of stroke only. The review did not report mortality.

Results
Results indicate that heavy alcohol consumption (more than 60g alcohol/day) increases the relative risk of stroke. Light or moderate alcohol consumption (less than 12g per day) may be protective against total and ischaemic stroke.

Limitations
The majority of included studies were conducted in the U.S or mainland Europe. Only studies by Shaper et al (1991); Palmer et al (1995); Hart et al (1999) from 19 cohort studies and studies by Gill et al (1986); Gill et al (1988); Gill et al (1991); Ben-Shlomo et al (1992); Shinton et al (1993) from 16 case-control studies were conducted in the United Kingdom.

Summary
Meta-analysis revealed a J-shaped relationship between alcohol consumption and total and ischaemic stroke and a linear relationship between alcohol consumption and haemorrhagic stroke.

Evidence statement 15: There is strong evidence that heavy alcohol consumption increases the risk of stroke. Light or moderate consumption may be protective against total and ischaemic stroke, although the evidence on this is not as clear and it is important to acknowledge that this effect is not consistent for all types of stroke.

3.1.4 Neoplastic Diseases

All of these studies consider the relationship between alcohol consumption and various cancers. The review of reviews by Rehm (2003) found consistent evidence for a causal relationship for lip and oropharyngeal cancer; oesophageal cancer; female breast cancer; liver cancer and laryngeal cancer**.** Rehm (2003) found inadequate evidence for a causal relationship for stomach cancer, colon cancer, rectal cancer, lung cancer, ovarian cancer and prostate cancer

Details of studies
A total of 8 systematic reviews met the inclusion criteria. (Table 22) All reviews were published in English, between 2001-2007. The study by Corrao et al (2004) covered most of the neoplastic conditions. Moskal et al (2007) covered more than one condition. The largest number of reviews were located for colon cancer and rectal cancer (3 studies each). Stomach cancer was not included in any identified reviews.

Outcomes
The majority of studies examined mortality rather than morbidity. Although this has the advantage of being a definitive and unequivocal outcome this may result in an underestimation of the effects of alcohol in terms of burden of illness. There is a consistent pattern across many studies of moderate drinking being of marginal risk but higher levels resulting in heavily increased risk.

Results
There is therefore consistent evidence for a causal relationship for lip and oropharyngeal cancer; oesophageal cancer; female breast cancer; liver cancer and laryngeal cancer**.** Considerable uncertainty exists, however, in specific relation to the association of moderate alcohol consumption and breast cancer. Alcohol intake of at least 30g-40g/day increased the risk of breast cancer but the extent of this risk was found to be low an no risk elevation was found below 20g/day (Burger et al, 2004).

No additional review was found for stomach cancer. There is therefore still inadequate evidence on whether alcohol causes stomach cancer.

The three reviews looking at colon cancer support a statistically significant association with alcohol consumption at levels greater than 45g/day (Moskal et al, 2007). Similarly, for rectal cancer there was a statistically significant association with alcohol consumption, this time at the lower level of 30g/day, Evidence from one review, by Freudenheim et al (2005), confirms the difficulties of establishing a causal relation with lung cancer initially reported in Rehm's review. The authors report a slight trend to greater risk for 30g/day but suggest that residual confounding by smoking may explain some of this effect. Genkinger et al (2006) similarly confirm that studies examining ovarian cancer have failed to establish a causal link to alcohol and Dagnelie et al (2004) find likewise for prostate cancer.

Summary
All the reviews identified as published since Rehm's review therefore confirm the state of evidence for all neoplastic conditions as an accurate synopsis for the present time. Not only do none of the reviews contradict Rehm's overall verdict on each condition but the same difficulties in interpretation or lack of availability of evidence (e.g. for stomach cancer) continue to persist.

Evidence statement 16: There is strong evidence for statistically significant associations with a wide range of cancers including some of the most common cancers in the UK. However the evidence is not consistent across all neoplastic conditions. Further research is required for stomach and lung cancer in particular.

Table 21 Chronic alcohol-related health effects (neoplastic conditions) identified by various meta-analyses

Disease	ICD-9	Deaths England and Wales (1997) (White *et al*, 2004)	Effect (According to Rehm *et al* (2003)	Recent Meta-analyses	Findings
Lip and oropharyngeal cancer	**140, 141, 143–146, 148, 149, 230.0**	**1682**	**Detrimental**	NA	NA
				Corrao et al (2004)	Direct trend in risk starting from 25g/day (RR= 1.86 (1.76-1.96)
Oesophageal cancer	**150, 230.1**	**5855**	**Detrimental**	Corrao et al (2004)	Direct trend in risk starting from 25g/day (RR= 1.39 (1.36-1.42)
				NA	NA
Stomach cancer	151	*Inadequate evidence that alcohol causes stomach cancer - inconsistent research evidence*	Detrimental	Cho et al (2004)	Increased risk for colorectal cancer was limited to persons with alcohol intake of 30 g/d or greater (approximately ≥2 drinks/d), a consumption level reported by 4% of women and 13% of men. Compared with nondrinkers, pooled multivariate relative risks were 1.16 (95% CI, 0.99 to 1.36) for persons who consumed 30 to less than 45 g/d and 1.41 (CI, 1.16 to 1.72) for those who consumed 45 g/d or greater. No significant heterogeneity observed. Association evident for cancer of proximal colon and distal colon.
Colon cancer	153	10447	Detrimental	Moskal et al (2007)	30g/day or greater (approx 2+ drinks per day) correlated with modest relative elevation in colon cancer rate (1.08 0.89 to 1.31 for 30-45 g/dayor 1.45 (1.14 to 1.83 for 45g/dayor greater). Study could not investigate lifetime alcohol consumption, alcohol consumption at younger ages or change of consumption at follow-up.
				Corrao et al (2004)	Direct trend in risk starting from 25g/day (RR= 1.05 (1.01-1.09)
				Cho et al (2004)	Increased risk for colorectal cancer was limited to persons with alcohol intake of 30 g/d or greater (approximately ≥2 drinks/d), a consumption level reported by 4% of women and 13% of men. Compared with nondrinkers, pooled multivariate relative risks were 1.16 (95% CI, 0.99 to 1.36) for persons who

					consumed 30 to less than 45 g/d and 1.41 (CI, 1.16 to 1.72) for those who consumed 45 g/d or greater. No significant heterogeneity observed. No clear difference in relative risks was found between specific beverages
Rectal cancer	154	4771	Detrimental	Moskal et al (2007)	30g/dayor greater (approx 2+ drinks per day) correlated with modest relative elevation in rectal cancer rate (1.42 1.07-1.88 for 30-45 g/dayor 1.49 (1.04 -2.12 for 45g/dayor greater). Study could not investigate lifetime consumption, consumption at younger ages or change of consumption at follow-up.
				Corrao et al (2004)	Direct trend in risk starting from 25g/day (RR= 1.09 (1.08-1.12)
				Corrao et al (2004)	Direct trend in risk starting from 25g/day (RR= 1.19 (1.12-1.27)
Liver cancer	**155, 230.8**	**1979**	**Detrimental**	Corrao et al (2004)	Direct trend in risk starting from 25g/day (RR= 1.43 (1.38-1.48)
Laryngeal cancer	**161, 231.0**	**791**	**Detrimental**	Freudenheim et al (2005)	Slightly greater risk of lung cancer associated with consumption of 30g/daythan with no alcohol consumption (RR 1.21 0.91-1.61). Residual confounding by smoking may explain some of the observed relation.
Lung cancer	162	*Excluded from outcomes causally related to alcohol by English* et al. *(1995).*	Detrimental	Corrao et al (2004)	Direct trend in risk starting from 25g/day (RR= 1.25 (1.20-1.29)
Female breast cancer	**174, 233.0**	**11980**	**Detrimental**	Genkinger et al (2006)	Alcohol intake not associated with ovarian cancer risk (Age adjusted RR=1.11, 0.87-1.43; multivariate RR=1.12, 0.86-1.44)
Ovarian cancer	183	*Inadequate evidence that alcohol causes ovarian cancer (*Bagnardi et al. 2001)	Detrimental	Dagnelie et al (2004)	Overall consumption of alcohol not associated with risk of prostate cancer in 6 studies but associated with increased risk in two and decreased risk in one.
Prostate cancer	185	*Causality of relationship not yet clear (*Bagnardi et al*,* 2001)	Detrimental	Dennis & Hayes (2001)	Pooled analysis showed OR of 1.21 (95% CI 1.05-1.39) for men who drank 4+ drinks per day

3.1.5 Traffic injuries and deaths

Two meta-analyses were identified examining the effects of alcohol consumption on the incidence of traffic injuries and mortality.

Evidence statement 17: There is a significant and consistent effect between alcohol consumption and serious injury and for heavy drinking and road accidents. Heavy drinking levels of 5 drinks or more were found to be positively predictive of injury.

Table 20 Evidence for an association between alcohol consumption and risk of traffic accidents

Condition	*Meta-analysis*	*Findings*
	Cherpitel et al (2003a)	Significant, but not homogenous, effect size for consuming 5+ drinks on an occasion at least monthly with odds ratios (ORs) of 4.16 for positive blood alcohol concentration (BAC) and 3.92 for self-report. Frequency of drinking among non-heavy drinkers had largest effect size (5.93 for BAC and 4.93 for self-report). Heavy drinking, controlling for frequency, was also significant (ORs of 2.08 for BAC and 1.86 for self-report), but effect size was homogeneous only for self-report.
	Cherpitel et al (2003b)	Pooled odds ratios for blood alcohol concentration at time of emergency room visit and amount of alcohol consumed in 6 hr before injury were positively predictive (1.19 and 1.80, respectively) and heterogeneous across studies. Effect size changed little when age and gender were controlled. For drinkers reporting five or more drinks on an occasion during the last year, amount consumed was positively predictive of reporting a causal association of drinking and injury. Effect size of feeling drunk at time of injury, controlling for amount of alcohol consumed, was positively predictive (2.04) but heterogeneous across studies.

3.1.5 Suicides

These systematic reviews consider the relationship between alcohol consumption, both in terms of chronic alcohol dependence or acute episodes of heavy drinking, and suicide (E950-959) or attempted suicide. No further meta-analysis or synthesis has been attempted.

Details of studies

3 reviews met the inclusion criteria these were published in English, between 2004 and 2007. They therefore update the review by Rehm. Wilcox et al (2004) specifically examined the effect of heavy drinking on suicide.

Table 23 Systematic reviews associating alcohol consumption with suicide (3 studies)

Condition	*Meta-analysis*	*Findings*
Suicide (E950-959)	Cargiulo (2007)	Alcohol dependence associated with increased risks of suicide (OR 2.13 95% CI 1.18-3.85) and suicide attempts (OR 2.50 95% CI 1.38-4.52)
	Norström and Ramstedt (2005)	(Data pending)
	Wilcox et al (2004)	Overall SMR for heavy drinking was 351 (95% CI 251-478) while it was 39 (95% CI 5-140) for males

Outcomes
The three systematic reviews measured mortality associated outcomes presented either as odds ratios or as a standardised mortality ratio. Attempted suicide was also considered as an outcome (Cargiulo, 2007).

Results
All three reviews presented an association between alcohol consumption and either suicide or attempted suicide.

Evidence statement 18: There is moderate and consistent evidence to suggest that alcohol dependence is associated with increased risks of suicide (OR 2.13 95% CI 1.18-3.85) and suicide attempts (OR 2.50 95% CI 1.38-4.52). There are methodological difficulties in making an attribution of suicide to the harmful effects of alcohol.

3.1.6 Alcohol and sexually transmitted diseases

Alcohol consumption does not itself cause sexually transmitted diseases. However, it can directly affect risk either by increasing the risk that one is exposed to an STD through risky sexual behaviour and alcohol may also compromise the capability of the immune system to fight infections.

Details of studies
Cook & Clark (2005) conducted a systematic review of the relationship between alcohol consumption and sexually transmitted diseases (STD). They identified 42 eligible studies, of which only 11 included a measure of alcohol consumption that could be used to identify hazardous drinking.

Results
Eight of the 11 identified studies found an increased risk of STD, and the other three found no significant association. Results from studies with general measures of alcohol consumption were similar, with most finding a significant association with at least one STD.

Limitations
Of the three studies failing to find an effect, one had a very small sample size, another used a very insensitive measure of STD, and the third just missed achieving statistical significance. The 42 articles included over 30 different types of alcohol measurement descriptions, making it difficult to reach clear conclusions about which particular pattern of alcohol consumption is associated with the greatest risk.

Evidence statement 19: There is moderate evidence (from eight out of eleven studies included in a systematic review) to suggest that alcohol consumption is associated with increased incidence of sexually transmitted diseases. Because there are other possible explanations for risk behaviours there are significant difficulties in establishing a consistent mechanism for direct causal effects. However, this finding is supported by studies directly associating taxation or pricing changes for alcohol with changes in rates of sexually transmitted diseases including gonorrhoea.

Table 21 Alcohol consumption and risk of sexually transmitted diseases

Condition	*Meta-analysis*	*Findings*
Sexually transmitted diseases	Cook & Clark (2005)	Problem drinking is clearly associated with an increased risk of STDs across a wide variety of populations.

3.2 Alcohol consumption and social harm

Gmel and Rehm (2003) provide a definitive overview of social consequences of alcohol abuse. They begin by linking social consequences with the following elements of the DSM-IV for the definition of alcohol abuse:

> 1. Failure to fulfill major role obligations at work, school, or home (e.g., repeated absences or poor work performance, neglect of children or household)
>
> 2. Continued drinking even in situations where it is physically hazardous (e.g., driving an automobile or operating machinery)
>
> 3. Recurrent alcohol-related legal problems (e.g., arrests for disorderly conduct while drinking)
>
> 4. Continued drinking despite persistent or recurrent social or interpersonal problems it may cause (e.g., arguments with spouse, physical fights).

In accordance with this many commentators have looked at consequences relating to each category such as workplace absenteeism, unintentional injuries, and violence.

3.2.1 Violence

Attribution of violence or injury to alcohol consumption is important in assessing the burden of alcohol on society. Attribution has been assessed in several ways:

- Using *aggregate level data* collected on exposure rates to the risk factor (alcohol) and the relative risk of injury due to the use of alcohol in the event.
- Using *individual level assessments* of whether or not the injury would have occurred if the respondent had not been drinking alcohol (assessed across a range of consumption levels).

Both methods have their limitations – the former in being unable to establish a causal link between exposure and outcome and the latter in relying on individual perceptions of attribution (which may lead to under- or over-reporting). Alcohol-related costs of crime and disorder are put at £7.3 billion, and some 47% of victims of violence say that they believed their assailant to be under the influence of alcohol at the time of their attack. Health costs are estimated at an additional £1.7 billion a year (Academy of Health Sciences 2004). All of the included studies consider violence whether directed at strangers or at members of the more intimate circle of friends or family. Male alcohol consumption is an accepted risk factor for intimate partner violence.

Details of studies

Gil-Gonzalez and colleagues (2006) conducted a systematic review and meta-analysis of quantitative studies conducted between 1966–2004. Eight databases from Social and Behavioural Sciences, Clinical Medicine, and Life Sciences were reviewed. 22 studies fulfilled the inclusion criteria for the systematic review: 14 were cross-sectional studies, 6 case–series and 2 case–control studies. Ten studies analysed the relationship between alcohol and violence as their primary hypothesis.

Corrao et al (2004) included violence as an outcome of interest in their review of 15 health conditions attributable to alcohol. Grouping violence with injuries (there is no separate analysis) they observed a consistent and significant effect of alcohol at various levels of intake (25g/day 1.12 (1.06 –1.18); 50g/day 1.26 (1.13– 1.40) and 100g/day 1.58 (1.27 –1.95).

English et al (1995), Schultz et al (1991) and Single et al (1998) have used *meta-analysis* to attempt to establish a causal link between alcohol use, crime and violence (Rehm et al 2006).

Table 22 Percentage of violent events attributed to alcohol use

Type of violence	English *et al* (1995)	Schultz *et al*. (1991)	Single *et al* (1998)
Homicide or purposeful injury	47	46	27
Suicide	41 (m), 16 (f)	28	27 (m), 17 (f)

Results
For 11 papers included in the meta-analysis by Gil-Gonzalez et al (2006) the overall pooled odds ratio was 4.57 (95% CI 3.30–6.35), but a high degree of heterogeneity was observed. The magnitude of the effect was inversely associated with the year of publication. The biggest odds ratios were obtained in studies with small sample sizes.

Limitations
Only two studies examined by Gil-Gonzalez et al (2006) used a direct measure of alcohol consumption.

Evidence for a relationship between alcohol consumption and intimate partner violence is of low quality and may be subject to publication bias. Gil-Gonzalez and colleagues (2006) conclude that currently there is not enough empirical evidence to support preventive policies based on male alcohol consumption as a risk factor in the particular case of intimate partner violence.

Evidence statement 20: There is a consistent and statistically significant effect of alcohol on violence and injury at even quite low levels (25g/day) of consumption. Further research of higher quality using more rigorous designs is required to establish a robust causal explanation.

3.2.2 Divorce and marital problems

In a meta analysis, Marshal (2003) reports strong associations between alcohol consumption and marital dissatisfaction, negative interactions, and violence, and some empirical evidence of positive effects of light alcohol consumption on marital functioning. 60 studies were included in his meta-analysis.

Alcohol consumption is described in terms of the quantity and frequency of alcohol consumed in a given period i.e. how often an individual drinks (frequency) or how much an individual drinks in one sitting (quantity). Quantity–frequency indices are often employed by studies in this review and are used to calculate average daily or weekly estimates of a drinkers' volume of alcohol consumption.

Limitations
Despite strong evidence in support of a harmful effect of heavy alcohol use many of these studies are characterized by methodological limitations that threaten internal and external validity of their results. These limitations include small sample sizes, poor measurement quality and over-reliance on treatment samples.

Summary

There is considerable evidence supporting the conclusion that heavy and problematic alcohol use is associated with lower levels of marital satisfaction, higher levels of maladaptive marital interaction patterns, and higher levels of marital violence.

Evidence statement 21: There is a strong and consistent association between alcohol consumption and marital dissatisfaction, a risk factor for subsequent divorce. Further research is required to establish the direction of cause and effect.

3.2.3 Crime other than violence

Alcohol's close association with violent events (interpersonal and personal) has been documented (e.g. from prison studies, studies of sexual violence). This association stops short of causality. Collins (1982) explored the relationship between alcohol consumption and criminal behaviour. He concluded that there was sufficient evidence to justify the inference that alcohol is sometimes causally implicated in the occurrence of serious crime. He did point to the need for further empirical research and despite the ensuing years there is still a shortage of such evidence. This review did not identify any recent systematic reviews or meta-analyses of the effect of alcohol consumption on criminal behaviour. Currently the best evidence in terms of both rigour and relevance comes from the Home Office study by Richardson & Budd (2003). These investigators used multivariate analysis to confirm that, even when other factors were taken into account, frequency of drunkenness was still an important indicator of offending and disorderly behaviour. This was particularly apparent for violent crime. They calculated that 18-24-year-olds who got very drunk at least once a week had five and a half times the odds of admitting to a violence offence than those who got drunk less than once a month. The 2003 *Offending, Crime and Justice Survey* (Mathews & Richardson, 2005) found that binge drinkers were more likely to offend than others, and accounted for a disproportionate amount of the total number of crimes. In fact binge drinkers comprised 6% of the adult sample, but they accounted for 30% of all crimes reported, and 24% of all violent incidents,

Employment

Employment is another domain that is significantly impacted by alcohol consumption. Again the review was unable to identify a recent systematic review or meta-analysis covering this topic. There have been some attempts to conduct econometric studies of this domain. This is challenging given the wide variety of outcomes that might be selected for measurement and subsequent analysis. A key study, already included in Review 1 of this report is USA-based modelling work by Dave and Kaestner (2002) who examined the effect of alcohol taxes on employment, weekly work hours, and wages. They used the resulting analysis to explore the structural effects of alcohol use on labour market outcomes. They concluded that there is a weak and indeterminate relationship between alcohol taxes and labour market outcomes but acknowledged that, although this implies that alcohol use does not adversely affect labour market outcomes, this was inconsistent with findings from previous studies.

Evidence statement 22: No recent systematic reviews or meta-analyses were identified that examined the effects of alcohol on crime other than violence or on employment-related outcomes such as unemployment or absenteeism. There is sufficient non-review evidence to suggest that a significant proportion of criminal behaviour can be associated with alcohol misuse. However it is methodologically difficult to ascertain the alcohol attributable fraction for this association.

3.2.5 Alcohol and social problems: overall findings

Alcohol misuse can harm people other than the drinker, and can have negative consequences for society as a whole (Gmel & Rehm, 2003). It is believed to play a role in decreased worker productivity, increased unintentional injuries, aggression and violence against others, and child and spouse abuse. The evidence base does support an association between alcohol consumption and many of these social harms, but is not able to support a causal effect of such outcomes. Much of the research in this area has been criticised on the basis of methodological flaws and a requirement for better design and statistical methodology has been identified (Gmel & Rehm, 2003).

3.3 Conclusions

The above review builds upon earlier work by Rehm (2003) and by Gmel and Rehm (2003), together with the influential *Alcohol in Europe* report (Anderson, & Baumberg, 2006), in identifying multiple associations and several causal links between alcohol consumption and the harmful effects on health and society (including crime and violence). While the evidence is not conclusive for all conditions it is of sufficient quantity and quality to support an increased level of intervention for both economic and public health-related reasons. Where the evidence base is less conclusive is in relation to the levels at which harm may be attributed. Nevertheless the seminal study by Corrao et al (2004) demonstrates across 15 conditions that transition from a 25g/day threshold to other levels of consumption is associated with a significant increase in risk for most, but not all, of these conditions.

3.4 References: Review 3

Academy of Medical Sciences. (2004) *Calling Time. The Nation's Drinking as a Major Health Issue. A Report from the Academy of Medical Sciences .* Academy of Medical Sciences: London, 2004.

Anderson, P. & Baumberg, B. (2006) *Alcohol in Europe*. London: Institute of Alcohol Studies, 2006.

Ben-Shlomo Y, Markowe H, Shipley M, Marmot MG. (1992) Stroke risk from alcohol consumption using different control groups. *Stroke.* **23**:1093-1098.

Britton, A. and Marmot, M. (2004) Different measures of alcohol consumption and risk of coronary heart disease and all-cause mortality: 11-year follow-up of the Whitehall II Cohort Study. *Addiction* **99**, 109-16.

Collins, J.J. Jr. (1982) *Drinking and Crime: Perspectives on the Relationship between Alcohol Consumption and Criminal Behaviour*. London: Tavistock.

Dave, D. and Kaestner, R. (2002) Alcohol Taxes and Labour Market Outcomes. *Journal of Health Economics* 21, 357-371.

Doll, R., Peto, R., Boreham, J,& Sutherland, I. (2005). Mortality in relation to alcohol consumption: a prospective study among male British doctors International Journal of Epidemiology **34**:199–204

Fillmore KM et al. (2006) Moderate alcohol use and reduced mortality risk: systematic error in prospective studies. *Addiction Research and Theory*, 1–31.

Gill JS, Zezulka AV, Shipley MJ, Gill SK, Beevers DG. (1986) Stroke and alcohol consumption. *N Engl J Med.* **315**:1041-1046.

Gill JS, Shipley MJ, Hornby RH, Gill SK, Beevers DG. (1988) A community case-control study of alcohol consumption in stroke. *Int J Epidemiol.* **17**:542-547.

Gill JS, Shipley MJ, Tsementzis SA, et al. (1991) Alcohol consumption: a risk factor for hemorrhagic and non-hemorrhagic stroke. *Am J Med.* **90**:489-497.

Gmel, G. & Rehm, J. (2003) Harmful alcohol use*. Alcohol Research and Health*, **27** 52-62.

Gutjahr, E., & Gmel, G. (2001) Defining alcohol-related fatal medical conditions for social-cost studies in Western societies: An update of the epidemiological evidence. *Journal of Substance Abuse*, **13** (3), 239-264.

Harriss, L., English, D. Hoppoer, J., Powles, J., Simpson, J., O'Dea, K et al. (2007) Alcohol consumption and cardiovascular mortality accounting for possible misclassification of intake: 11-year follow-up on the Melbourne Collaborative Cohort Study. *Addiction* **102**, 1574-85.

Hart CL, Smith GD, Hole DJ, Hawthorne VM. (1999) Alcohol consumption and mortality from all causes, coronary heart disease, and stroke: results from a prospective cohort study of Scottish men with 21 years of follow up *BMJ.* **318**:1725-1729.

Jackson, R, Broad, J, Connor, J, Wells, S. (2005) Alcohol and ischaemic heart disease: probably no free lunch. *Lancet* **366**, 9501, 1911-1912.

Johansson, P., Jarl, J., Eriksson, A., Eriksson, M., Gerdtham, U.- G., Hemström, Ö., Hradilova Selin, K., Lenke, L., Ramstedt, M. & Room, R. (2006) *The Social Costs of Alcohol in Sweden 2002* (SoRAD Rapportserie, nr 36). Stockholm: Stockholms Universitet, SoRAD

Matthews S, Richardson A (2005) . *Findings from 2003 Offending, Crime and Justice Survey*, Findings 261, Home Office.

Palmer AJ, Fletcher AE, Bulpitt CJ, et al. (1995) Alcohol intake and cardiovascular mortality in hypertensive patients: report from the Department of Health Hypertension Care Computing Project. *J Hypertens.* **13**:957-964.
Rehm J, Patra J, Popova S. (2006) Alcohol-attributable mortality and potential years of life lost in Canada 2001: implications for prevention and policy. *Addiction*. **101**(3):373-84.
Richardson A and Budd T. (2003) *Alcohol, crime and disorder: a study of young adults* Home Office Research Study 263. London: Home Office Research, Development and Statistics Directorate.
Rimm EB, Williams P, Fosher K, Criqui M, Stampfer MJ. (1999) Moderate alcohol intake and lower risk of coronary heart disease: meta-analysis of effects on lipids and haemostatic factors. BMJ. 1999 Dec 11;319(7224):1523-8.
San Jose, B. (2003) Alcohol consumption and mortality: Comparison between countries and meta-analyses *European Journal of Epidemiology*, **18** (7), 603-605.
Shaper AG, Phillips AN, Pocock SJ, Walker M, Macfarlane PW. (1991) Risk factors for stroke in middle aged British men. *BMJ.* **302**:1111-1115.
Shinton R, Sagar G, Beevers G. (1993) The relation of alcohol consumption to cardiovascular risk factors and stroke: the West Birmingham Stroke Project. *J Neurol Neurosurg Psychiatry*. **56**:458-462.
Single, E., L., Robson, X., Xiaodi, and J., Rehm (1998) The Economic Costs of Alcohol, Tobacco and Illicit Drugs in Canada, 1992. *Addiction*, **93**(7), 991-1006.
Wannamethee SG, Shaper AG (1999). Type of alcoholic drink and risk of major coronary heart disease events and all-cause mortality. *Am J Public Health*. **89**(5):685-90.
WHO Expert Committee on Problems Related to Alcohol Consumption. (2007) Second report. *World Health Organ Tech Rep Ser.* (944):1-53, 55-7.

3.5 Included Meta-analyses: Review 3

Borges G, Cherpitel CJ, Orozco R, Bond J, Ye Y, Macdonald S, Giesbrecht N, Stockwell T, Cremonte M, Moskalewicz J, Swiatkiewicz G, Poznyak V. (2006) Acute alcohol use and the risk of non-fatal injury in sixteen countries. *Addiction.* **101**(7):993-1002.
Burger M, Brönstrup A, Pietrzik K. (2004) Derivation of tolerable upper alcohol intake levels in Germany: a systematic review of risks and benefits of moderate alcohol consumption. *Prev Med.*;**39**(1):111-27.
Cargiulo, T. (2007) Understanding the health impact of alcohol dependence. *American Journal of Health-System Pharmacy* **64** (5 SUPPL.), S5-S11.
Cherpitel CJ, Ye Y, Bond J, Borges G. (2003a) The causal attribution of injury to alcohol consumption: a cross-national meta-analysis from the emergency room collaborative alcohol analysis project. *Alcohol Clin Exp Res*. **27**(11):1805-12.
Cherpitel CJ, Bond J, Ye Y, Borges G, Macdonald S, Giesbrecht N. (2003b) A cross-national meta-analysis of alcohol and injury: data from the Emergency Room Collaborative Alcohol Analysis Project (ERCAAP). *Addiction.* **98**(9):1277-86.
Cherpitel CJ. (2007) Alcohol and injuries: a review of international emergency room studies since 1995. *Drug Alcohol Rev*. **26**(2):201-14.
Cho E, Smith-Warner SA, Ritz J, van den Brandt PA et al. (2004) Alcohol intake and colorectal cancer: a pooled analysis of 8 cohort studies. *Ann Intern Med*. **140**(8):603-13.
Cook, R.L. & Clark, D.B (2005). Is there an Association between Alcohol Consumption and Sexually Transmitted Diseases? A Systematic Review. *Sexually Transmitted Diseases,* **32**, (3): 56–164
Corrao G et al. (2004) A meta-analysis of alcohol consumption and the risk of 15 diseases. Prev Med. **38**(5):613-9.
Dagnelie PC, Schuurman AG, Goldbohm RA, Van den Brandt PA. (2004) Diet, anthropometric measures and prostate cancer risk: a review of prospective cohort and intervention studies. *BJU Int.* **93**(8):1139-50.
Dennis, L.K., & Hayes, R.B. (2001) Alcohol and prostate cancer, *Epidemiologic Reviews* **23** (1), 110-114.
Di Castelnuovo A, Costanzo S, Bagnardi V, Donati MB, Iacoviello L, de Gaetano G. (2006) Alcohol dosing and total mortality in men and women: an updated meta-analysis of 34 prospective studies. *Arch Intern Med*. **166**(22):2437-45. Comment in: *ACP J Club*. 2007 Mar-Apr;146(2):48.

Djoussé L and Gaziano MJ. (2008) Alcohol consumption and heart failure: A systematic review. *Current Atherosclerosis Reports* , 10 (2): p. 117-120

English DR, Holman CDJ, Milne E, Winter MG, Hulse GK, Codde JP, Bower CI, Corti B, De Klerk N, Knuiman MW, Kurinczuk JJ, Lewin GF, Ryan GA. (1995) *The quantification of drug caused morbidity and mortality in Australia.* Commonwealth Department of Human Services and Health, Canberra.

Eustace LW, Kang DH, Coombs D. (2003) Fetal alcohol syndrome: a growing concern for health care professionals.*J Obstet Gynecol Neonatal Nurs*. **32**(2):215-21.

Fillmore KM, Stockwell T, Chikritzhs T, Bostrom A, Kerr W. (2007) Moderate alcohol use and reduced mortality risk: systematic error in prospective studies and new hypotheses. *Ann Epidemiol.* **17**(5 Suppl):S16-23.

Freudenheim JL et al. (2005) Alcohol consumption and risk of lung cancer: a pooled analysis of cohort studies. *Am J Clin Nutr.* **82**(3):657-67.

Genkinger JM et al (2006) Alcohol intake and ovarian cancer risk: a pooled analysis of 10 cohort studies. *Br J Cancer*. 2006 Mar 13;94(5):757-62.

Gil-González D, Vives-Cases C, Álvarez-Dardet C, and J. Latour-Pérez. Alcohol and intimate partner violence: do we have enough information to act? *European Journal of Public Health* **16**(3):278-284

Henderson J, Gray R, Brocklehurst P. (2007a) Systematic review of effects of low-moderate prenatal alcohol exposure on pregnancy outcome. *BJOG*. **114**(3):243-52. Epub 2007 Jan 12. Review. Erratum in: *BJOG*. 2007 Jul;**114**(7):914-5.

Henderson J, Kesmodel U, Gray R. (2007b) Systematic review of the fetal effects of prenatal binge-drinking. *J Epidemiol Community Health*. **61**(12):1069-73.

Howard AA, Arnsten JH, Gourevitch MN. (2004) Effect of alcohol consumption on diabetes mellitus: a systematic review. *Ann Intern Med.* **140**(3):211-9.

Iestra JA et al. (2005) Effect size estimates of lifestyle and dietary changes on all-cause mortality in coronary artery disease patients: a systematic review. *Circulation*. 2005 **112**(6):924-34. Comment in: *ACP J Club*. 2006 Jan-Feb;**144**(1):16. *Circulation.* 2006 Jul 11;**114**(2):e40; author reply e41.

Koppes LL et al. (2006) Meta-analysis of the relationship between alcohol consumption and coronary heart disease and mortality in type 2 diabetic patients. *Diabetologia.* **49**(4):648-52. Epub Feb 4.

Li TK. (2008) Quantifying the risk for alcohol-use and alcohol-attributable health disorders: present findings and future research needs. *J Gastroenterol Hepatol.* **23** Suppl 1:S2-8.

Marshal MP. (2003) For better or for worse? The effects of alcohol use on marital functioning, *Clinical Psychology Review*, **23** (7),. 959–997.

Moskal A, Norat T, Ferrari P, Riboli E. (2007) Alcohol intake and colorectal cancer risk: a dose-response meta-analysis of published cohort studies. *Int J Cancer*. **120**(3):664-71.

Norström T, Ramstedt M. (2005) Mortality and population drinking: a review of the literature. *Drug Alcohol Rev.* ;**24**(6):537-47.

Rehm, J, Room, R, Graham, K, Monteiro, M, Gmel, G & Sempos, CT. (2003) The relationship of average volume of alcohol consumption and patterns of drinking to burden of disease: an overview. *Addiction* **98** (9), 1209-1228.

Reynolds K et al. (2003) Alcohol consumption and risk of stroke: a meta-analysis. *JAMA.* **289**(5):579-88. Erratum in: *JAMA*. 2003 **289**(21):2798.

Shultz J, Rice D, Parker D, Goodman R, Stroh G, Chalmers N. (1991) Quantifying the disease impact of alcohol with ARDI software, *Public Health Reports* **106**, 443-450.

Single E, Robson L, Xie X, Rehm J. *The Costs of Substance Abuse in Canada*, Ottawa: CCSA, 1996.

Sullivan LE, Fiellin DA, O'Connor PG (2005). The prevalence and impact of alcohol problems in major depression: a systematic review. *Am J Med.* **118**(4):330-41.

Taylor B & Rehm J. (2006) When risk factors combine: the interaction between alcohol and smoking for aerodigestive cancer, coronary heart disease, and traffic and fire injury. *Addict Behav.* **31**(9):1522-35.

Taylor B, Rehm J, Gmel G. (2005) Moderate alcohol consumption and the gastrointestinal tract. *Dig Dis.***23**(3-4):170-6.

White IR, Altmann DR, Nanchahal K. (2002) Alcohol consumption and mortality: modelling risks for men and women at different ages. *BMJ.* **325**(7357):191. Comment in: *BMJ.* 2002 **325**(7369):904.

White IR, Altmann DR, Nanchahal K. (2004) Mortality in England and Wales attributable to any drinking, drinking above sensible limits and drinking above lowest-risk level. *Addiction.* **99**(6):749-56. Comment in: *Addiction*. 2004 Jun;**99**(6):661-2.

Wilcox, H.C., Conner, K.R., Caine, E.D. (2004) Association of alcohol and drug use disorders and completed suicide: An empirical review of cohort studies *Drug and Alcohol Dependence* **76** (SUPPL.), S11-S19.

Appendix 1

Search Strategy for Pricing & Promotion Reviews

Database: Ovid MEDLINE(R) <1950 to January Week 3 2008>
Search Strategy:
---
1 Alcohol Drinking/ (35677)
2 exp Alcoholic Beverages/ (8991)
3 or/1-2 (42647)
4 campaign$,.tw. (14694)
5 promot$.tw. (334487)
6 Advertising as Topic/ (10063)
7 advert$.tw. (6696)
8 publicity.tw. (1484)
9 Marketing/ (1533)
10 market$.tw. (41329)
11 pric$.tw. (22054)
12 or/4-11 (417508)
13 3 and 12 (1931)
14 limit 13 to yr="2000 - 2008" (1051)
15 limit 14 to english language (994)

Appendix 2

Search Strategy for Review of Harmful Effects

Database: Ovid MEDLINE(R) <1996 to March Week 3 2008>
Search Strategy:
---
1 Alcohol Drinking/ (17700)
2 alcohol.ti. (19578)
3 1 or 2 (29316)
4 search.tw. (62459)
5 3 and 4 (266)
6 limit 5 to English language and yr="2000 - 2008" (220)