

Does marketing communication impact on the volume and patterns of consumption of alcoholic beverages, especially by young people? - a review of longitudinal studies

Scientific Opinion of the Science Group of the European Alcohol and Health Forum

Foreword

I am delighted to be contributing a foreword to this first formal output from the Science Group to the European Alcohol and Health Forum. This piece of work is responding to a request from the Forum and highlights the need for clarity in this contentious but important area. The actual drafting of this scientific opinion was accomplished by an internal Working Group, the members of which have worked thoroughly and diligently over the last few months. They have produced a report that has been unanimously accepted by the Science Group, with no minority opinions. The findings of the review are clear, namely that commercial communications increase the likelihood that adolescents will start to use alcohol and to drink more if they are already using alcohol. When reading this scientific opinion, it should be remembered that only a small part of the marketing mix has been analysed and reported.

I very much hope that the European Alcohol and Health Forum will find this analysis helpful, and I wish to pay particular thanks to the Working Group, and to the members of the Science Group who made particular contributions.

Professor Ian Gilmore
Chair, Science Group

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Summary

The European Alcohol and Health Forum requested scientific advice from the Science Group on the impact of marketing communication on the volume and patterns of consumption of alcoholic beverages, especially by young people. The opinion of the Science Group noted that marketing communications are just one aspect of determinants of alcohol consumption and alcohol-related harm, and that it can be difficult to isolate the impact of one aspect from another. The opinion also noted that a total marketing strategy includes not only marketing communication and promotional activities, but also product development, pricing, physical availability, and market segmentation and targeting, factors not considered in the available published studies.

The Science Group considered the advantages and disadvantages of a number of different methodologies that could be used to inform answers to the question “does marketing communication impact on the volume and patterns of consumption of alcoholic beverages, especially by young people”, including:

1. Qualitative studies that investigate the relationship between exposure to portrayals of alcohol use in the mass media and drinking expectancies of children and adolescents;
2. Econometric Studies that investigate the relationship between the amount of alcohol advertising and the amount of drinking taking place in a particular jurisdiction using econometric methods;
3. Cross-sectional studies which take a snapshot of advertising exposure (awareness and/or appreciation) and levels of drinking, and look for correlations between the two;
4. Experimental studies, in which exposure to alcohol in commercials or in movies is linked to immediate and observed use of alcohol;
5. Case studies, where changes in regional, national or international law that affect the volume or content of marketing communication have been studied and reported for their impact on changes in the use of alcoholic beverages; and
6. Longitudinal studies which measure exposure at time A, and how this relates to drinking at future time B.

These different methodologies have all been used to help answer questions about the nature and size of the impact of marketing on drinking patterns and volume. They all have potential methodological shortcomings and the results obtained through these various approaches vary. The Science Group concluded that longitudinal studies are best placed to offer insight into the nature of the relationship, provided potential confounders (such as intentions to drink, peer and parental drinking) are controlled for.

Also, given the voluntary nature of the work, and the limited time frame to prepare the opinion, it was decided to make good use of two existing peer reviewed systematic reviews of longitudinal studies (Anderson *et al.* 2009; Smith & Foxcroft 2009). The reviews identified 13 longitudinal studies that investigated the impact of marketing communications on initiation and continuation of alcohol use amongst 38,000 young people aged 10-21 years drawn from the United States (9 studies), New Zealand (1 study), Belgium (1 study) and Germany (1 study).

The studies measured exposure to marketing communication in a variety of ways, including estimates of the volume of media and advertising exposure, ownership of branded merchandise, recall and receptivity, and one study on expenditure on advertisements. Follow-up ranged from 8 to 96 months. One study reported outcomes at multiple time-points, 8, 16 and 24 months, and another study at 3, 5, and 8 years. Seven studies provided data on initiation of alcohol use amongst non-drinkers, three studies on maintenance and frequency of drinking amongst baseline drinkers, and

seven studies on alcohol use of the total sample of non-drinkers and drinkers at baseline. Twelve of the thirteen studies reported an impact of exposure on subsequent alcohol use, including initiation of drinking and heavier drinking amongst existing drinkers, with a dose response relationship in all studies that reported such exposure and analysis. There was variation in the strength of association, and the degree to which potential confounders were controlled for. The thirteenth study, which tested the impact of outdoor advertising placed near schools, failed to detect an impact on alcohol use, but found an impact on intentions to use.

Based on the consistency of findings across the studies, the confounders controlled for, the dose-response relationships, as well as the theoretical plausibility and experimental findings regarding the impact of media exposure and commercial communications, it can be concluded from the studies reviewed that alcohol marketing increases the likelihood that adolescents will start to use alcohol, and to drink more if they are already using alcohol.

1. BACKGROUND AND CONTEXT

At its second plenary meeting on 16th April 2008, the European Alcohol and Health Forum decided that the Forum's Science Group should "look in more depth at the diverging points of view on the relationship between marketing and volume of consumption (especially by young persons)". These diverging points of view had come to the fore at meetings of the Forum's Task Force on Marketing Communication.

The Commission services then prepared a draft Task Request to the Science Group which was circulated among all Forum members for comments, the final Task Request (see Annex I) was sent to the members of the Science Group to be discussed at its first meeting on 30th June 2008. The Chair of the Science Group suggested the establishment of a dedicated Working Group to prepare a scientific report on the topic.

The Working Group consisted of the following persons:

Peter Anderson (chair)
David Foxcroft (corresponding member)
Eileen Kaner (corresponding member)
Marjana Martinic
Jacek Moskalewicz
Alojz Nociar.

The Working Group met on 28th October 2008 to agree its method of working, which was approved by the science group at its meeting of 29th October. The Science Group adopted the report of the Working Group at its meeting of 23rd February 2009, with no minority opinions.

2. APPROACHES

2.1 Other determinants of alcohol consumption

First, it was noted that marketing communications are just one aspect of determinants of alcohol consumption and alcohol-related harm, and that sometimes it can be difficult to isolate the impact of one aspect from another. In addition, the level of alcohol consumption and the prevalence of hazardous and harmful alcohol use mediate the relative impact of differing policy options - for example, those that affect the price and availability of alcohol, as well as its marketing, and those that address drinking and driving, or make available brief interventions for alcohol use disorders (Chisholm *et al.* 2004; Anderson *et al.* 2009).

2.2 Multilevel marketing strategies

Second, it was noted that a total marketing strategy is multilevel, including not only marketing and promotional activities, but also product development, pricing, physical availability, and market segmentation and targeting (NCI 2008). Further, while alcohol is marketed through increasingly sophisticated advertising in mainstream media, it is also promoted by linking alcohol brands to sports and cultural activities through sponsorships and product placements, and by direct marketing that uses new technologies such as the Internet, podcasting and mobile telephones (World Health Organization 2007).

2.3 Existing systematic reviews

Third, three systematic reviews¹ have recently considered the effects of commercial communications on the use of alcohol.

The first systematic review was undertaken by Smith & Foxcroft (2009), funded by the Alcohol and Education Research Council of the United Kingdom, and included nine publications reporting on seven longitudinal studies including the effect of alcohol advertising, marketing and portrayal on drinking behaviour in young people.

The second systematic review was by Meier (2008), an independent review of the effects of alcohol pricing and promotion for the UK Department of Health by the School of Health and Related Research of the University of Sheffield, England. This review addressed the total population, and covered advertising in general, as well as price and point of sales promotions, billboard and print media, alcohol related merchandising, broadcast media, and the impact of advertising bans and other restrictions.

The third systematic review was by Anderson *et al.* (2009) and included sixteen publications reporting on thirteen studies, including all nine studies in Smith & Foxcroft' review, as well as more recent and 'in press' publications not covered by Smith & Foxcroft (there were no differences in inclusion or exclusion criteria between the two reviews). The review considered the impact of alcohol advertising and media exposure on adolescent alcohol use.

2.4 A focus on young people

Fourth, the remit was to answer the question, does marketing communication impact on the volume and patterns of consumption of alcoholic beverages, especially by young people. Implicit in this task request is to consider the impact on all segments of the population, although with a special emphasis on young people. However, given that the recent review for the UK Department of Health comprehensively deals with the whole population (Meier 2008), recognizing also that the vast majority of published studies refer to young people, the Science Group restricted its analysis to a specific focus on young people, as they are a particularly vulnerable group, with a potential to experience risk or harm in the short term and throughout their lives (Newbury-Birch *et al.* 2008).

2.5 Differing methodologies

Finally, fifth, a number of different methodologies that could be used to inform answers to the question "does marketing communication impact on the volume and patterns of consumption of alcoholic beverages, especially by young people" were considered. These are briefly considered in turn.

2.5.1 Qualitative studies that investigate the relationship between exposure to portrayals of alcohol use in the mass media and drinking expectancies of children and adolescents

Alcohol advertising is one of the many factors that have the potential to encourage youth drinking. For young people who have not started to drink, expectancies² are influenced by normative assumptions about teenage drinking as well as through the observation of drinking by parents, peers, and models in the mass media. Research has linked exposure to portrayals of alcohol use in the mass media with the development of positive drinking expectancies by children and adolescents

¹ A systematic review is a review of a clearly formulated question that uses systematic and explicit methods to identify, select, and critically appraise relevant research, and to collect and analyse data from the studies that are included in the review. Statistical methods (meta-analysis) may or may not be used to analyse and summarise the results of the included studies. Glossary of Terms in the Cochrane Collaboration (2005).

² The action or fact of expecting (Oxford English Dictionary, 2nd Edition, 1989), in this context expecting the use of alcohol.

(Austin and Knaus 2000; Austin *et al.* 2000; Austin *et al.* 2006). Young people with more positive affective responses to alcohol advertising hold more favourable drinking expectancies, perceive greater social approval for drinking, believe drinking is more common among peers and adults, and intend to drink more as adults (Chen and Grube 2002). Fourteen year olds with greater exposure to advertisements in magazines, at sporting and music events and on television are more advertisement-aware than those with less exposure, as are teens who watch more TV, pay attention to beer advertisements and know adults who drink (Collins *et al.* 2003). Amongst 10-17 year olds, the perceived likeability of beer advertisements is a function of the positive affective responses evoked by the specific elements featured in the advertisements. Liking of specific elements featured in beer advertisements, such as humour, animation, and popular music, significantly contribute to the overall likeability of these advertisements and subsequently to advertising effectiveness indicated by intent to purchase the product and brand promoted by the advertisements (Chen *et al.* 2005).

Although experimental studies find positive relations between alcohol expectancies and alcohol use (Bot *et al.* 2005), expectancy studies, by themselves, do not establish whether alcohol advertising actually influences young people's drinking behaviour. Further, there is increasing evidence that such pre-behaviour cognitions, for example, expectancies and attitudes, are related to consumption in a more complex way. For example, for adolescent smoking, it has been shown that, over time, behaviour can predict attitudes more strongly than attitudes can predict behaviour (de Leeuw *et al.* 2008).

2.5.2 Econometric Studies that investigate the relationship between the amount of alcohol advertising and the amount of drinking taking place in a particular jurisdiction using econometric methods.

A recent meta-analysis³, which included 322 estimated elasticities⁴ obtained from 132 studies (Gallet 2007), found a positive impact of advertising on consumption (coefficient, 0.029), which, in a meta-regression procedure, controlling for alcohol price and income was significantly larger for spirits than for beer. A coefficient of 0.029 means that for every 10% increase in advertising expenditure, consumption would be expected to increase by 0.3%. Much stronger elasticities were noted for price of alcohol –5.2% in the short term and –8.2% in the long term, and for income, +6.8% in the short term and +8.6% in the long term.

However, although potentially very important, econometric⁵ studies run into a number of methodological difficulties. First, measures of the amount of advertising, which typically use expenditure on advertising, vary in accuracy and inclusiveness. Second, analysis depends on the construction of a complex model that ascribes values for all the different variables – including price, drinking restrictions and disposable income – as well as advertising that might be implicated. Third, variations in the amount of advertising tend to be minor, so researchers are looking for potentially

³ A meta-analysis is the use of statistical techniques in a systematic review to integrate the results of included studies. Sometimes misused as a synonym for systematic reviews, where the review includes a meta-analysis. Glossary of Terms in the Cochrane Collaboration (2005).

⁴ Econometric studies use the term **elasticity** to measure how much alcohol consumption or alcohol-related harm changes when a price measure changes (in this case advertising expenditure). **Price elastic** Alcohol is described as **elastic** when the percent change in the amount of alcohol consumed is **greater** than the percent change in expenditure. **Price inelastic** Alcohol is described as **inelastic** when the percent change in the amount of alcohol consumed is **less** than the percent change in expenditure. For example, an elasticity of -0.1 would mean that a 10% rise in advertising expenditure would lead to a 1% fall in consumption, and would be described as 'inelastic'. Inelastic does **not mean** that consumption is not responsive to changes in expenditure. It only means that the proportional change is less.

⁵ Statistical methods used by economists to investigate the association between economic factors and alcohol use or alcohol-related problems

small changes in drinking patterns. Fourth, measures of the overall amount of advertising do not necessarily give an accurate picture of youth exposure.

Thus, it is not surprising that only modest effects have been found in some studies, whilst others have found no effects (for a review, see Saffer & Dave 2006). For example, looking at alcohol advertising expenditure data across US States, Saffer & Dave (2006) found, when controlling for alcohol price, income and a number of socio-demographic variables, that advertising expenditure had a modest and independent effect on adolescent monthly participation in using alcohol and in binge drinking. It was estimated 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%. On the other hand, controlling for price, income and minimum legal drinking age across US states, Nelson found, although total alcohol consumption was negatively related to bans of spirit price advertising (ban led to less consumption, coefficient, -0.009), it was positively related to bans of billboards (which accounted for only 8% of total alcohol advertising) (ban led to more consumption, coefficient, 0.054).

2.5.3 Cross-sectional studies which take a snapshot of advertising exposure (awareness and/or appreciation) and levels of drinking, and look for correlations between the two

Because they cannot show whether exposure preceded drinking uptake, cross-sectional studies leave open the possibility that any correlation may arise because young drinkers are more likely to be interested in and seek out advertising, rather than the reverse situation. However, as Aitken *et al.* (1988) have pointed out, paying attention to advertising presupposes that the viewer is getting some benefit or reward from it, most fundamentally that they are doing the right thing by consuming the advertised product, and advertisers deliberately design their work to provide such rewards (Aitken 1988). Thus, cross-sectional data can shed a useful light on the role alcohol advertising plays in young people's drinking. And, cross-sectional studies have consistently reported correlations between increased exposure and greater likelihood of current drinking (see Kuo *et al.* 2003; McClure *et al.* 2006; Hanewinkel *et al.* 2007; Hurtz *et al.* 2007). For example, the cross-sectional study of Hanewinkel *et al.* (2007) found a dose response relationship between exposure to alcohol use from popular contemporary movies and alcohol use without parental knowledge and binge drinking in Germany.

2.5.4. Experimental studies, in which exposure to alcohol in commercials or in movies is linked to immediate and observed use of alcohol

The Science Group was informed of one of the first ever experimental studies linking alcohol portrayal on television and actual drinking behaviour (Engels *et al.* 2009). In a naturalistic setting (a bar lab) 40 young adult male pairs (80 participants) watched a movie clip with two commercial breaks for 1 hour and were allowed to drink non-alcoholic and alcoholic beverages. The movies 'American Pie 2' (2001) and '40 Days and 40 Nights' (2002) were selected because they were comparable concerning genre and MPAA-rating (The Motion Picture Association of America). In 'American Pie 2', characters drank alcohol 18 times and alcoholic beverages were portrayed an additional 23 times. In '40 Days and 40 Nights', characters consumed alcohol 3 times and alcoholic beverages were portrayed an additional 15 times. After 14 and after 33 minutes the movie clips were interrupted by a commercial break for 3.5 minutes, containing either exclusively neutral advertisements (e.g., promoting a car or a video camera) or neutral advertisements combined with alcohol advertisements. Each of the combined breaks contained two alcohol commercials. The participants were randomly assigned to one of four conditions varying on type of movie (many versus few alcohol portrayals) and commercials (alcohol commercials present or not). The results indicated that, independently, participants assigned to the conditions with substantial alcohol exposure in either movies ($F = 4.44$; $p < .05$) or commercials ($F = 4.93$; $p < .05$) consumed more alcohol than other participants, controlling for the participant's weekly alcohol consumption. Those

in the condition with higher alcohol portrayal in movie and commercials drank on average 3 glasses within a period of 1 hour, compared to 1.5 glasses drank by those in the condition with little or no alcohol portrayal.

2.5.5 Case studies, where changes in regional, national or international law that affect the volume or content of marketing communication have been studied and reported for their impact on changes in the use of alcoholic beverages

Over time, countries have changed their advertising laws and regulations, and it would be informative to know the impact of these changes. However, if case studies do show that restrictions in advertising are associated with reductions in alcohol use, the question has to be asked, does this mean that advertising affects consumption? The answer would be only if such restrictions take place in the absence of any other policy interventions, but this is unlikely as alcohol policy changes at any one time tend to incorporate a range of measures. Nevertheless, a number of countries of the newer Member States have lifted their previous ban on advertising which was followed by rapid increases in alcohol consumption, particularly among younger people. However, the members of the Science Group were unaware of published scientific documents that analyzed natural changes in marketing laws or regulations, and, due to resource constraints, were unable to systematically search for such documentation. The Science Group noted this as an area for future research and was informed that the European Commission FP7 co-financed project, AMPHORA, would be systematically looking for such natural experiments.

2.5.6 Longitudinal studies which measure exposure at time A, and how this relates to drinking at future time B

It was concluded that longitudinal studies could provide the best indication currently available for cause-effect relationships, in particular, provided potential confounders (such as intentions to drink, peer and parental drinking) were controlled for.

Also, given the voluntary nature of the work, and the limited time frame to conclude the work, it was decided to make good use of the two existing systematic reviews of longitudinal studies that had both been peer-reviewed, and which identified sixteen published papers from thirteen individual studies (Anderson *et al.* 2009; Smith & Foxcroft 2009).

The sixteen publications were divided amongst the four non-corresponding members of the Working Group, with each study summarized and checked by two members of the Working Group, within the following headings (see Annex II):

- Study
- Country
- Baseline survey date
- Age group (years)
- Study objective
- Alcohol marketing & media exposure
- Drinking behaviour outcome measure
- Sample/ Study Design
- Survey method
- Baseline sample size
- Follow-up (months)
- Follow-up rate
- Analysis
- Covariates/ confounders analyzed
- Outcome at follow-up

3. ANALYSIS AND DESCRIPTION OF LONGITUDINAL STUDIES

The results of the individual studies are detailed in the annexe, and the results are brought together, categorized by exposed media studied, including overall alcohol advertising, brand recall and receptivity, TV advertisements, TV and video exposure, exposure to alcohol use in motion pictures, radio, magazines, beer concession stands, in-store displays, ownership of alcohol branded merchandise, and outdoor advertising, summarized in the table on page 18.

3.1 The impact of overall alcohol advertising on alcohol use

Three studies, one in New Zealand (with three publications) and two in the United States, investigated the impact of overall advertising on alcohol use.

Connolly *et al.* (1994) investigated the impact of the number of commercial alcohol advertisements recalled by study participants aged 13 and 15 years on average and maximum amounts of alcohol consumed on a single occasion and on frequency of drinking at age 18 years amongst 667 young people in a multi-disciplinary longitudinal study of growth and development in New Zealand. There was no significant relationship between exposure and wine and spirit consumption. For males, the number of commercial advertisements recalled at age 15, but not 13, predicted average ($p=0.047$) and maximum amounts of beer ($p=0.008$) consumed on a single-drinking occasion. For females, the number of commercial advertisements recalled at age 13, but not 15, predicted frequency of beer consumption ($p=0.029$). Although significant relationships were detected, some of them could have been due to chance, since results for more than 35 statistical tests were reported⁶. Based on the same cohort, Casswell & Zhang (1998) followed 630 aged 18 beer drinkers until age 21 years, and found that liking of alcohol advertisements at age 18 significantly predicted beer consumption at age 21 (Standardized coefficient 0.36 (SE=0.06, T=6.6)). The measure of liking of alcohol advertising was based on responses to three items. For two of these 'alcohol advertisements have plenty of action' and 'alcohol advertisements show the type of people I admire', responses were given on a four-point scale from agree strongly to disagree strongly. Strong agreement was expressed by 6% and 28% of the sample, respectively. For the third item, 'Comparing alcohol adverts generally with other ads, which of the following do you most agree with?', responses were given on a five-point scale, 'like a lot more' to 'like a lot less'. Six per cent of the sample liked alcohol advertisements a lot more than other advertisements and a further 13% liked them a little more. Beer consumption at both age 18 years (Standardized coefficient 0.14 (SE=0.03, T=3.6)) and 21 years (Standardized coefficient 0.70 (SE=0.03, T=21.3)) predicted alcohol-related aggression at 21 years. Based on the same cohort, Casswell *et al.* (2002) studied 714 participants who were alcohol drinkers at ages 18, 21 and 26 years, and found that liking of alcohol advertisements at age 18 did not predict trajectories of quantities of alcohol consumed per occasion for both men and women over the age 18-26 years. Liking of alcohol advertisements at age 18 marginally predicted being in a higher trajectory for frequency of drinking for men (OR=1.6, $p=0.0706$), but not for women over the age 18-26 years.

Snyder *et al.* (2006) studied the impact of alcohol advertising expenditures and the degree of exposure to alcohol advertisements (TV, radio, outdoor advertising and magazines) on alcohol use amongst 15 to 26 year olds in 24 Nielsen local geographical media markets (Nielsen is a company that tracks media exposure) in USA. Individuals were randomly sampled within households and households within media markets. Local geographical markets were systematically selected from the top 75 media markets in the US representing 79% of the population. For those aged <21 years, each additional alcohol advertisement seen increased the number of drinks consumed in the previous

⁶ Researchers commonly use 5% as the cut off point for statistical significance. This means that only in 5% of all cases carried out with the specific design the result would have come about by chance. Thus, when 35 tests are carried out, by chance alone one might expect 1-2 of the tests to be statistically significant, when, in fact, they are not.

month by 1% (event rate ratio=1.01, 95% CI=1.001-1.021). Each additional dollar per capita spent on alcohol advertisements increased the number of drinks consumed in the previous month by 2.8% (event rate ratio=1.028, 95% CI=1.002-1.056). Seeing more or fewer advertisements in a particular month than he or she typically saw was a significant predictor of drinking (event rate ratio = 1.002, 95% CI=1.001-1.003). The study has been criticized for the attrition in the study sample (from 1872 at wave one to 588 at wave four), and for confusing correlation with causality (Schultz 2006; Smart 2006). However, attrition was greatest among the heaviest drinking segment of the sample, suggesting under-estimation in the findings, and although the study provided associational, prospective evidence on alcohol advertising effects on youth drinking, it addressed limitations of other research, particularly the unreliability of exposure measures based on self-reporting (Snyder & Salter 2006).

Collins *et al.* (2007) carried out a school based longitudinal survey which evaluated the impact of alcohol marketing exposure on beer use amongst 1786 grade 6 students (11-12 years olds) one year later. Seventeen per cent reported past year beer drinking at grade 7. The joint effect of exposure to advertisements from all sources was significant, $F(8, 28) = 8.36, p < 0.0001$. Twenty per cent of youth in the 75th percentile of alcohol marketing exposure at grade 6 reported past year beer drinking at grade 7, compared with 13% in the 25th percentile.

3.2 Brand recognition, recall and receptivity

One study in the United States investigated the impact of brand recognition, recall and receptivity on alcohol use.

Henriksen *et al.* (2008) used a non-random longitudinal survey to investigate the influence of alcohol advertising and promotions on the initiation of alcohol use amongst 1080 non-drinking students. Twenty nine per cent of never drinkers at baseline had initiated alcohol use at 12 month follow-up. Brand recognition, OR=1.15 (1.02-1.29), brand recall, OR=1.16 (1.05-1.29) and high receptivity to alcohol marketing, OR=1.77 (1.27-1.48) predicted initiation. When receptivity to alcohol marketing was controlled, recall and recognition no longer statistically significantly predicted alcohol initiation.

3.3 TV advertisements

Three studies, all in the United States, investigated the impact of TV commercials on alcohol use, two of which restricted the analysis to beer use.

Stacy *et al.* (2004) studied the impact of TV alcohol commercials on alcohol use amongst 2,250 12 to 13 years old school children in California. At baseline, 16% reported drinking beer, 15% wine, and 8% three-drink episodes in the past month. At twelve months follow-up, prevalence was 18% reported drinking beer, 20% wine and 12% three-drink episodes. At one-year follow-up, 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/liquor drinking (95% CI=17%-52%), and a 26% increase in odds of consuming 3 or more drinks on one occasion (95% CI=8%-48%) during the previous 30 days, controlling for covariates related to drinking behaviour. The watched TV sports index was positively associated with beer drinking, adjusted OR= 1.20 (95% CI: 1.05-1.37), but not with wine/liquor drinking or 3 or more drinks on one occasion. Self-reported frequency of exposure was also positively associated with beer drinking, OR= 1.21 (95% CI: 1.04-1.41), but not to wine/liquor drinking or 3 or more drinks on one occasion. A cued-recall memory test and draw-an-event memory test, did not show significant relationships with any of the outcomes, and, although the relationships were in the direction of positive associations, there was one exception, a draw-an-event memory test being associated with a reduced risk of beer use (OR=0.86, 95%CI=0.75-0.99).

Ellickson *et al.* (2005) studied the impact of exposure to different forms of alcohol advertising on initiation of alcohol use and frequency of drinking amongst existing drinkers, and whether exposure to a prevention programme mitigated any such relationship amongst US adolescents age 12 to 13 years. Forty eight per cent of 1206 grade 7 non-drinkers consumed alcohol during the previous year at grade 9. Bivariate analyses found a significant impact of TV beer advertisements on initiation of drinking (OR=1.25, $p < 0.05$), but no significant relationship was found when controlling for main confounders, including exposure to all different types of advertising and the impact of the prevention programme. Weekly television viewing, controlled for alcohol advertisement exposure, was inversely related to onset of drinking, explained as a 'babysitter' effect, whereby youth who watch more TV have fewer opportunities to drink.

Collins *et al.* (2007) found a significant impact of beer advertising from three combined TV sources on beer use ($F(3, 33) = 3.35, p < 0.05$). The odds ratios (95%CI) for beer drinking for the individual TV sources were: ESPN cable network (an American cable television network dedicated to broadcasting and producing sports-related programming 24 hours a day) 1.08 (0.83-1.42); other sports beer ads 1.19 (1.01-1.40); other TV beer ads 1.13 (0.95-1.34).

3.4 TV and video exposure

Two studies, one in the United States and one in Belgium, investigated the impact of TV and video exposure on alcohol use.

Robinson *et al.* (1998) studied the impact of TV and video exposure (TV, music video and videotape viewing, and computer and video game use) on initiation of alcohol use and maintenance of drinking among existing drinkers amongst 1,533 14 to 15 year olds from six public high schools in California. During 18 months follow-up, 325 (36%) baseline non-drinkers initiated drinking and 322 (51%) drinkers continued drinking. Controlling for the effects of age, gender, ethnicity, and the exposure to other media, each 1-hour increase per day in television viewing was associated with a 9% increased risk for initiating drinking (OR=1.09 (1.01-1.18)). Contrary to the study of Ellickson *et al.* (2005), this study did not find a 'babysitter' effect. Each 1-hour increase per day in watching music videos was associated with a 31% increased risk for initiating drinking (OR=1.31 (1.17-1.47)). During 18-month follow-up, 322 (51%) drinkers continued drinking. There were no significant associations between media exposure and maintenance of drinking.

Van den Bulck & Beullens (2005) studied the impact of TV and music video exposure on use of alcohol whilst going out amongst 2,546 first and fourth year secondary school students in Flanders, Belgium. Two-thirds of students (64%) watched music videos at least several times a week, and about one-third watched daily. The quantity of alcohol consumed while going out at follow-up period related to overall TV viewing ($\beta = 0.068, t = 3.46, p = 0.001$) and music video exposure ($\beta = 0.073, t = 3.05, p = 0.004$), with each measure predicting 7% of the quantity of alcohol consumed at follow-up.

3.5 Alcohol use in motion pictures

Three studies, two in the United States and one in Germany, investigated the impact of exposure to alcohol use in motion pictures on alcohol use.

Sargent *et al.* (2006) conducted a randomised school-based cross-sectional survey, with longitudinal follow-up amongst 2406 non-drinking 10-14 year olds at baseline 12 to 26 months later, to evaluate the impact of exposure to alcohol use in popular contemporary movies and incident alcohol drinking. Baseline median ever exposure to alcohol use in 601 movies was 8.6 hours, (inter-quartile range (IQR)=4.6-13.5). 357/2406 students (15%) initiated drinking alcohol. Exposure predicted the use of alcohol during the follow-up period (OR=1.15, 95%CI=1.06-1.25). Analysis with quadratic exposure effect (OR=0.996, 95% CI=0.992-0.999) showed that the relationship between exposure of

alcohol use in motion pictures and initiation of alcohol use was stronger among adolescents in lower exposure categories. In other words, although the effect is seen throughout the population, 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 adolescents. This finding would argue in favour of the notion that exposure to movie alcohol use is an independent risk factor and not simply a marker for risk-prone adolescents whose life circumstances (low parental supervision, low academic engagement, etc.) allow them to view a lot of movies.

Hanewinkel & Sargent (2008) studied the impact of exposure to alcohol use in movies on initiation of alcohol use amongst 3432 German 10-16 year olds who had previously never drunk alcohol. The estimated mean ever movie alcohol exposure was 3.2 hours, subsequently divided into 4 quartiles. One third (33%) of students initiated drinking without parental knowledge and 14% initiated binge drinking (5 or more drinks within 2 hours) during a 12-13 months follow-up. Compared with quartile 1, the adjusted RRs (95% CI) for drinking without parental knowledge were 1.42 (1.16-1.74) for Q2, 1.94 (1.65-2.28) for Q3 and 2.0 (1.69-2.37) for Q4; and for binge drinking 1.44 (0.96-2.17) for Q2, 1.95 (1.27-3.0) for Q3, and 2.23 (1.48-3.37) for Q4. The un-adjusted dose-response curve showed that the response was greatest for relatively low exposure adolescents. Adjusting for covariates accentuated this effect, because the attenuation was larger for the highly exposed adolescents; this was probably due to risk factors for alcohol use tending to cluster among the high exposure adolescents, who are at risk for alcohol use for reasons besides other than their excessive media exposure. In another study, Hanewinkel *et al.* (2008) found a positive dose-response relationship between lack of parental movie restriction and risk of initiation of binge drinking amongst the same sample.

Wills *et al.* (2008) studied the impact of exposure to alcohol use in movies on 'ever use' of alcohol, binge drinking and alcohol-related problems amongst a random sample of 6522 US 10-14 year olds. A previous survey had shown that 83% of movies viewed by the sample, including 57% of movies rated as acceptable for child viewing, depicted alcohol use (Cin *et al.* 2008). Over half (52%) of these movies, including 19% of movies acceptable for child viewing, contained at least one appearance of a branded alcohol product, exposing the adolescents on average to 5.6 hours of movie use and 244 alcohol brand appearances. In the impact study, alcohol use viewed in movies averaged 31 minutes at baseline, 34 minutes at 8 months follow-up, and 30 minutes at 16 months follow-up. Movie alcohol exposure at baseline significantly predicted alcohol use at 8 months (coefficient =0.1), Movie alcohol exposure between baseline and 8 months did not predict alcohol use at 8 months (coefficient =-0.03), but did predict alcohol problems at 16 months (coefficient=0.13). Movie alcohol exposure between 8 and 16 months predicted alcohol use at 16 months (coefficient =0.08). At all times, alcohol use predicted alcohol problems (such as problems at school, with the family, or involvement in crime) and there were significant indirect and independent effects of movie exposure at baseline, 8 and 16 months on alcohol problems at 24 months.

3.6 Radio

One study in the United States investigated the impact of radio advertising on alcohol use.

Collins *et al.* (2007) found, when controlling for main confounders, including exposure to all different types of advertising, an impact of radio listening on beer use that just failed to reach statistical significance (odds ratios (95%CI) = 1.17 (1.00-1.37)).

3.7 Magazines

Two studies, both in the United States, investigated the impact of magazine advertising on alcohol use.

Ellickson *et al.* (2005) found a significant bivariate relationship between the impact of exposure to magazines with alcohol advertisements and initiation into drinking (OR= 1.27, $p<0.05$) and drinking frequency (coefficient = 0.21, $p<0.05$). After controlling for main confounders, including exposure to all different types of advertising and the impact of the prevention programme, the relationship with drinking initiation was no-longer significant (OR=1.12, $p>0.05$), but the frequency of drinking was (coefficient = 0.10, $p<0.05$).

Collins *et al.* (2007) found a significant bivariate relationship between the impact of magazine reading and beer drinking (OR= 1.15, 95%CI= 1.06-1.26), which, when controlling for main confounders, including exposure to all different types of advertising, was no longer significant (OR = 0.96, 95%CI = 0.87-1.06).

3.8 Beer concession stands

Two studies, both in the United States, investigated the impact of beer concession stands on alcohol use.

Ellickson *et al.* (2005) found a significant bivariate relationship of the impact of exposure to beer concession stands on initiation of drinking (OR= 1.31, $p<0.05$) and drinking frequency (coefficient = 0.22, $p<0.05$), which when controlling for main confounders, including exposure to all different types of advertising and the impact of the prevention programme, remained significant on initiation of drinking (OR=1.42, $p<0.05$), and for frequency of drinking (coefficient = 0.09, $p<0.05$).

Collins *et al.* (2007), referred to above, found a significant bivariate relationship between the impact of exposure to beer concession stands and beer drinking (OR= 1.27, 95%CI= 1.14-1.41), which, when controlling for main confounders, including exposure to all different types of advertising, was no longer significant (OR= 1.01, 95%CI = 0.91-1.13).

3.9 In store displays

Two studies, both in the United States, investigated the impact of in-store display advertising on alcohol use.

Ellickson *et al.* (2005) found a significant bivariate relationship between the impact of exposure to in-store alcohol advertisement displays and the initiation of drinking (OR= 1.36, $p<0.05$) and drinking frequency (coefficient = 0.11, $p<0.05$), which when controlling for main confounders, including exposure to all different types of advertising and the impact of the prevention programme, became non-significant on initiation of drinking (OR=1.06, $p>0.05$), and for frequency of drinking (coefficient = 0.0, $p>0.05$).

Collins *et al.* (2007) found a significant bivariate relationship between the impact of exposure to in-store beer displays and beer drinking (OR= 1.25, 95%CI= 1.12-1.39), which, when controlling for main confounders, including exposure to all different types of advertising, was no longer significant (OR= 1.03, 95%CI = 0.92-1.14).

3.10 Ownership of alcohol branded merchandise

Three studies, all in the United States, investigated the impact of ownership of alcohol-branded merchandise (ABM) on alcohol use.

Collins *et al.* (2007) found a significant bivariate relationship between the impact of ownership of beer promotional items and beer drinking (OR= 3.54, 95%CI= 2.55-4.90), which, when controlling for main confounders, including exposure to all different types of advertising, remained significant (OR= 1.76, 95%CI= 1.23-2.52).

Fisher *et al.* (2007) conducted a non-random, prospective cohort study to investigate the impact of ownership of, or willingness to use, an alcohol promotional item on initiation of alcohol use and binge drinking (5 or more alcohol drinks over a few hours at least once over past year). At the one year time point, 611/3283 girls (19%) and 384/2228 boys (17%) initiated alcohol use. The odds ratio of alcohol initiation during the 12 month period was 1.74 (95% CI, 1.37-2.19) for girls and 1.78 (1.36-2.33) for boys; this analysis compared participants who owned or were willing to use an alcohol promotion item with those who did or would not. In addition, 149/611 drinking girls (24%) and 112/384 drinking boys (29%) engaged in binge drinking. The odds ratio of binge drinking was 1.79 (1.16-2.77) for girls and 0.87 (0.51-1.48) for boys comparing those who owned or were willing to use an alcohol promotion item with those who did or would not.

Using the same cohort as Wills *et al.* (2008), McClure *et al.* (2008) studied the impact of ownership of alcohol branded merchandise (ABM) on initiation of alcohol use and binge drinking. ABM ownership increased from 11% at baseline (the eight month measurement period reported by Wills *et al.* (2008)) to 20% 16 months later. Ten per cent of adolescents tried drinking for the first time and 5% tried binge drinking during each of the two 8 month periods. There was a reciprocal relationship between susceptibility to alcohol use (three survey items that assessed response to peer offers, intentions and positive expectancies) and ABM ownership. Ownership of ABM at baseline did not have a significant direct impact on alcohol initiation at 8 months (HR=1.41, 95% CI 0.98-2.01), nor on alcohol initiation between 8 and 16 months (HR=1.57, 95% CI=0.99-2.5), but did on initiation of binge drinking at 8 months (HR=1.80, 95% CI=1.28-2.54), but not initiation of binge drinking between 8 and 16 months (HR= 1.44, 95% CI=0.90-2.31). New ownership of ABM at 8 months had a significant direct impact on alcohol initiation at 16 months (HR=2.31, 95%CI=1.6-3.35) and initiation of binge drinking at 16 months (HR=2.22, 95%CI=1.49-3.32).

3.11 Outdoor advertisements

One study in the United States investigated the impact of outdoor advertising on alcohol use.

Pasch *et al.* (2007) investigated the impact of exposure of outdoor alcohol advertisements within 1500 feet (457m) of 63 Chicago school sites. Sixty one of these schools which were part of Project Northland Chicago, a randomized controlled trial of an alcohol use prevention programme. On average, each school site had 14.8 alcohol advertisements within 1500 feet (457m). 2027/2586 (78%) students followed up were non-users of alcohol at baseline, but initiation of alcohol use was not reported. Exposure to alcohol advertisements at 6th grade did not predict alcohol behaviour amongst 6th grade alcohol users and non-users at 8th grade, but, amongst 6th grade non-users, did predict at 8th grade intentions to use alcohol (e.g., “do you think you will be drinking alcohol in the next month”), (f=6.29, p=0.01.)

4. DISCUSSION

Although the full body of the evidence is not uniform in its findings, nevertheless, the longitudinal studies described here show considerable consistency in outcome across a good number of well-designed studies in a highly complex field. The longitudinal studies find an impact of alcohol marketing on drinking, consistent with the findings of econometric studies, and supported by experimental findings. The impact applied to overall advertising (3/3 studies), and, when controlling

for exposure to other types of marketing, brand recall and receptivity (1/1 study), TV advertisements (2/3 studies), TV and video exposure (3/3 studies), alcohol use in motion pictures (3/3 studies), beer concession stands (1/2 studies), and alcohol branded merchandise (3/3 studies), but not for radio (1/1 study), magazines (2/2 studies), or in store displays (2/2 studies).

The findings are consistent with the conclusions of the three previous systematic reviews:

Smith & Foxcroft (2009) concluded: “The data from these studies suggest that exposure to alcohol advertising in young people influences their subsequent drinking behaviour. The effect was consistent across studies, a temporal relationship between exposure and drinking initiation was shown, and a dose response between amount of exposure and frequency of drinking was clearly demonstrated in three studies. It is certainly plausible that advertising would have an effect on youth consumer behaviour, as has been shown for tobacco and food marketing.” The authors further noted: “Inferences about the modest effect sizes found are limited by the potential influence of residual or unmeasured confounding.”

Meier (2008) concluded (section 2.7, conclusion): “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.”

Anderson *et al.* (2009) concluded: “Longitudinal studies consistently suggest that exposure to media and commercial communications on alcohol is associated with the likelihood that adolescents will start to drink alcohol, and with increased drinking amongst baseline drinkers. Based on the strength of this association, we conclude that alcohol advertising and promotion increases the likelihood that adolescents will start to use alcohol, and to drink more if they are already using alcohol.”

Six potential influences on the inferences, validity and strength of these findings are discussed below.

4.1 Theoretical basis

The findings are consistent with theoretical models of the impact of alcohol advertising on young people that go beyond a simple view that advertising primarily works by changing consumer attitudes to a product or by increasing brand salience before changes in behavioural patterns occur (see Jernigan 2006). Studies in neuroscience, psychology and marketing conclude that “adolescents may be especially attracted to risky branded products that, in their view, provide immediate gratification, thrills, and/or social status.” (Pechmann *et al.* 2005). According to the Message Interpretation Process (MIP) model, individuals progressively internalize messages using a combination of logically and emotionally dominated processing strategies (Austin *et al.* 2006). The model, supported by decision-making theory, social cognitive theory, and dual-process theories of persuasion, proposes that certain responses to messages interrelate in ways that progressively lead to behavioural decisions. If a portrayal corresponds closely to personally relevant reference groups, for example, children will be more likely to wish to emulate the portrayal. If children admire a mediated reference group such as models in an advertisement, they will tend to expect that imitating the models’ behaviours will bring positive results.

4.2 Experimental studies

The findings are supported by the results of what seems to be the first controlled, randomised experiment which found a causal link between exposure to drinking models in movies and alcohol commercials on acute alcohol consumption (Engels *et al.* 2009, see section 2.5.4 above).

4.3 Size of the impact

Although the findings confirm an impact of some forms of alcohol marketing on drinking onset, frequency and quantity of alcohol consumed, and on alcohol problems, the size of the impact, even though statistically significant, is, on average, not large.

One of the few studies that allowed an estimate of the absolute size of impact was that by Collins *et al.* (2007) of 11-12 year olds. At one year follow-up, 17% had reported drinking beer during the past year. Twenty per cent of those in the highest quartile of advertising exposure (including exposure to television advertisements, magazine reading, radio listening, beer concessions, in-store beer displays, and ownership of beer promotional items), had used beer during the previous year, compared with 13% in the lowest quartile, a 50% increase.

Four limitations bear on the small impact. First, a number of studies investigated the impact of a range of marketing strategies. Whilst the bivariate analyses found significant relationships between exposure to the individual marketing strategies and alcohol use, it is not surprising that multivariate analyses, which not only controlled for psycho-social confounders, but also for exposure to all the other marketing strategies, found fewer individual marketing strategies with significant relationships to alcohol use. For example, Ellickson *et al.* (2005) found significant effects for all five marketing exposures studied in bivariate analyses, which reduced to two (beer concession stands and TV viewing) in multivariate analyses, which also controlled for the impact of a prevention programme. Similarly, Collins *et al.* (2007) found significant bivariate relationships for all six marketing exposures studied, which reduced to two (TV advertisements and beer promotional items) in multivariate analyses. This study was unusual in analyzing the joint effect of exposure to all six marketing exposures, whose impact was found to be highly significant ($p < 0.001$).

Second, most of the studies were conducted in the United States, where the minimum legal drinking age is 21 years. It is possible that younger students may not admit to drinking, which would have led to an underestimate of the impact of advertising.

Third, most of the studies do not devote attention to the content of marketing communication and its quality. Advertising is treated as a black box or series of black boxes which apparently have a similar impact depending only on length of exposure, without taking into account the quality of advertising, which could be important for a marketing success or its failure.

Fourth, the impact of marketing communication studied is isolated from other marketing strategies which are likely to be just as powerful, including product development, price and physical availability. Thus only one part of marketing has been studied, which perhaps makes the relatively small impact recorded across the studies all the more significant.

4.4 Dose response relationship

The findings in the opinion are strengthened by dose response relationships reported in this literature. Seven (Robinson, Chen & Killen 1998; Ellickson *et al.* 2005, Sargent *et al.* 2006; Pasch *et al.* 2007; Henriksen *et al.* 2008; Hanewinkel & Sargent 2008; Wills *et al.* 2008) of the eight studies that measured the impact of exposure on initiation of drinking included an interval or continuous level exposure measure, and all seven studies found a dose response relationship. For example, in the study by Hanewinkel & Sargent (2008), there was a dose-response relationship between hours of alcohol exposure in movies watched without parental knowledge and initiation of drinking as well as binge drinking. The study by Sargent *et al.* (2006) found a linear association between movie exposure portraying alcohol use and onset of alcohol use from zero incidence at zero exposure to an incidence of 20% when exposure reached 11 hours. Two (Robinson, Chen & Killen 1998; Ellickson *et*

al. 2005) of the three studies that measured the impact of exposure on maintenance of drinking amongst baseline drinkers included an interval level exposure measure, one of which (Ellickson *et al.* 2005) found a dose-response relationship with frequency of drinking. Six of the seven studies (Connolly *et al.* 1994; Stacy *et al.* 2004; Van den Bulck & Beullens 2005; Snyder *et al.* 2006; Sargent *et al.* 2006; Pasch *et al.* 2007) on alcohol use of the total sample of non-drinkers and drinkers at baseline included an interval level exposure measure, and all studies found a dose response relationship. For example, in the study by Stacy *et al.* (2004), each one standard deviation increase in alcohol advertising exposure was associated with a 44% increase in odds of beer drinking, a 34% increase in odds of wine/liquor drinking, and a 26% increase in odds of consuming 3 or more drinks on one occasion during the previous 30 days; in the study by Snyder *et al.* (2006) of US individuals aged 15 to 26 years, for each additional advertisement seen the number of drinks consumed increased by 1%, and for each additional dollar spent per capita on alcohol advertisements the number of drinks consumed increased by 3%; in the study by Collins *et al.* (2007), youth in the 75th percentile of alcohol marketing exposure at grade 6 were 50% more likely to be drinking at grade 7 than youth in the 25th percentile; finally, in the study by Pasch *et al.* (2007), the greater the exposure to outdoor advertising near schools, the greater the intention to drink (although, this study found no impact on drinking behaviour, the authors noted that this possibly could be due to a lack of statistical power).

4.5 Longitudinal studies and time period

The findings are also strengthened by a temporal relationship between exposure and outcome variables, with communication exposure pre-dating future alcohol consumption. Nevertheless, it is difficult to understand the mechanisms of how exposure at baseline could have an impact over a follow-up period that commonly ranged between 8 and 24 months. Presumably, the baseline measurement must reflect similar differences in exposure throughout the follow-up period, for an impact to be found after 24 months. The one study on multiple measurement points at 8 month intervals helps to clarify this. For example, when investigating the influence of exposure to alcohol use in movies, Wills *et al.* (2008) found that movie alcohol exposure at baseline predicted alcohol use at 8 months, whilst movie alcohol exposure between baseline and 8 months did not predict alcohol use at 8 months, but did predict alcohol problems at 16 months, and movie alcohol exposure between 8 and 16 months predicted alcohol use at 16 months. At all times, alcohol use predicted alcohol problems and there were significant indirect and independent effects of movie exposure at baseline, 8 and 16 months on alcohol problems at 24 months. In the same study, when investigating the influence of ownership of alcohol branded merchandise (ABM) McClure *et al.* (2008) found that ABM ownership at baseline had a significant direct impact on initiation of binge drinking at 8 months, but not initiation of binge drinking between 8 and 16 months, whereas new ownership of ABM at 8 months had a significant direct impact on initiation of binge drinking at 16 months.

4.6 Confounders

A potential limitation of the findings is the relationship between the variables of interest and other confounding factors. Whilst all the studies to a varying extent, measured and controlled for other variables likely to be associated with drinking uptake, including expectancy about alcohol, family and peer drinking, and relevant demographic variables, it is impossible to know if all relevant variables were measured and adjusted for, and thus not possible to know if residual confounders could have influenced the analysis, either way increasing or decreasing the impact of exposure (Fewell *et al.* 2007).

One important potential confounder is intentions to drink which might influence both marketing exposure and drinking. Several studies controlled for related variables (such as peer and adult drinking), and the three studies which specifically controlled for intentions to drink all found an affect of marketing (Stacy *et al.* 2004; McClure *et al.* 2008; Wills *et al.* 2008).

A similar study on the effect of seeing tobacco use in films on trying smoking among adolescents undertook a sensitivity analysis to estimate the potential impact of an unknown confounder (Sargent *et al.* 2001). The authors found that with a dichotomous film variable (below median exposure versus above median exposure), the product of the odds ratio for the association between an unmeasured covariate and smoking in films with the odds ratio for the unmeasured covariate and adolescent smoking would have to be ≥ 22 to invalidate their results. For the strongest measured confounder (friend smoking) this product was 11.2, making such an important unmeasured covariate very unlikely. Similar analyses could be done for some of the alcohol studies.

5 OVERALL CONCLUSIONS

Despite the above methodological concerns and despite the fact that not all studies found an impact for all the individual marketing exposures studied, nevertheless, the overall description of the studies found consistent evidence to demonstrate an impact of alcohol advertising on the uptake of drinking among non-drinking young people, and increased consumption among their drinking peers. This finding is all the more striking, given that only a small part of a total marketing strategy has been studied, and is corroborated by the results of the other methodologies, including qualitative, econometric, cross-sectional and experimental studies. It should be stressed that the studies come from countries with a long history of advertising and with relatively high levels of alcohol consumption, and it is difficult to speculate the size of the impact of marketing in cultures with either a short history of advertising or low alcohol consumption.

Table summarizing impacts found for overall advertising, brand recall and receptivity, TV advertisements, TV and video exposure, exposure to alcohol use in motion pictures, radio, magazines, beer concession stands, in-store displays, ownership of alcohol branded merchandise, and outdoor advertising.

Exposure	Study [reference] Country Baseline survey date Age group (years)	Impacts found in bivariate analyses	Covariates/ confounders analyzed	Impacts found in multivariate analyses controlling for confounders, including all forms of advertising
Overall advertising	Connolly <i>et al.</i> (1994) New Zealand 1985 13 and again at 15		Gender Socio-economic status Living situation Occupation Peer approval of people who drink Number of moderation messages recalled Number of hours of TV watched	<u>Beer</u> <u>Men</u> Average consumption, p=0.047 <u>Women</u> Consumption frequency, p=0.029 <u>Wine and spirits</u> No impact
	Casswell & Zhang (1998). Same sample as Connolly <i>et al.</i> (1994) above. New Zealand 1990/91 18		Gender	<u>Beer</u> Liking of alcohol advertisements Standardized coefficient 0.36, SE=0.06, T=6.6
	Casswell <i>et al.</i> (2002). Same sample as Connolly <i>et al.</i> (1994) and Casswell & Zhang (1998) above New Zealand 1990/91 18		Gender Ease of access to alcohol Access to licensed premises Living arrangement Parental consumption Level of education Age of onset of regular drinking	Liking of alcohol advertisements <u>Men</u> Frequency of drinking OR=1.6, p=0.0706 <u>Women</u> No effect
	Snyder <i>et al.</i> (2006) US 1999 15-26 (52% <21)		Gender Age Ethnicity School status Alcohol sales per capita	For those aged <21 years Previous month consumption , Event rate ratio=1.01, 95%CI=1.001-1.021
	Collins <i>et al.</i> (2007) US (South Dakota) 2000 Grade 6 (age 11-12)		Gender Ethnicity Parental monitoring Adult drinking Peer drinking Parent approval Friend approval	Combined exposure to beer ads on TV (on subscription sports channel, other sports programs, other TV programs), in magazines, on radio, at

			School grades Depressed mood Deviance Impulsivity Religiosity Sports participation Weekly TV viewing Parental education Grade 6 beer drinking	concessions stands and on in-store displays, and ownership of alcohol promotional items (hats, posters or T-shirts) found that 20% of youth in 75 th percentile of alcohol marketing exposure at grade 6 reported past year beer drinking at grade 7, compared with 13% in 25 th percentile. [F (8, 28) =8.36, p<0.0001]
Brand recall and receptivity	Henriksen <i>et al.</i> (2008) US (California) 2003 10-15		Grade Gender Ethnicity Parental drinking Peer drinking Perceived peer drinking Perceived peer approval of drinking Risk taking Unsupervised hours after school Self-reported grades	Initiation Brand recognition OR=1.15 (95% CI 1.02-1.29) Brand recall, OR=1.16 (95% CI 1.05-1.29) High receptivity to alcohol marketing, OR=1.77 (95% CI 1.27-1.48)
TV advertisements	Stacy <i>et al.</i> (2004) US (California) 2000 US 7 th Grade (normally 12-13 years)		Gender Ethnicity School Participation in team sports Perception of friends' alcohol use Perceived peer approval of alcohol use Intentions to use alcohol Perceptions of adults' alcohol use General TV viewing frequency Ad memorability (cued-recall and drawing)	Each 1 standard deviation increase in alcohol advertising exposure associated with 44% increase in odds of beer drinking (95% CI=27%-61%), 34% increase in odds of wine/liquor drinking (95% CI=17%-52%), and 26% increase in odds of consuming 3 or more drinks on one occasion (95% CI=8%-48%) during previous 30 days.
	Ellickson <i>et al.</i> (2005) US (South Dakota) 1997 7 th grade (age 12-13)	Initiation of drinking (OR= 1.25, p<0.05) Frequency of drinking (coefficient = 0.05, not significant)	Gender Ethnicity TV viewing Adult drinking Adult approval of drinking Peer drinking Peer approval of drinking	No significant relationship

		School grades Religiosity Parental monitoring Alcohol beliefs Deviance Impulsivity Playing sports Exposure to prevention programme	
	Collins <i>et al.</i> (2007) US (South Dakota) 2000 Grade 6 (age 11-12)	Gender Ethnicity Parental monitoring Adult drinking Peer drinking Parent approval Friend approval School grades Depressed mood Deviance Impulsivity Religiosity Sports participation Weekly TV viewing Parental education Grade 6 beer drinking	<u>Beer use</u> All 3 TV sources on beer use, $F(3, 33) = 3.35$, $p < 0.05$. Individual sources: ESPN cable network 1.08 (95% CI 0.83-1.42) Other sports beer ads 1.19 (95% CI 1.01-1.40) Other TV beer ads 1.13 (95% CI 0.95-1.34).
Media exposure	Robinson <i>et al.</i> (1998) US (California) 1994 Mean age (SD) 14.6 (0.5)	Age Gender Ethnicity Hours of other media watched	Each 1-hour increase per day in TV viewing associated with a 9% increased risk for initiating drinking (OR=1.09 (95% CI 1.01-1.18)). Each 1-hour increase per day in watching music videos associated with a 31% increased risk for initiating drinking (OR=1.31 (95% CI 1.17-1.47)).
	Van den Bulck & Beullens (2005) Belgium 2003 13 and 16 years of age	Age School year Gender Pubertal development status Smoking status Drinking at baseline	Quantity of alcohol consumed while going out at follow-up period related to overall TV viewing ($\beta=0.068$, $t=3.46$, $p=0.001$) and music video exposure ($\beta=0.073$, $t=3.05$, $p=0.004$).

	Ellickson <i>et al.</i> (2005) US (South Dakota) 1997 7 th grade (age 12-13)	<u>Initiation of drinking</u> MTV (OR= 1.65, p<0.05) Jerry Springer (OR= 2.48, p<0.05) Loveline (OR= 3.19, p<0.05) <u>Frequency of drinking</u> MTV (coefficient = 0.29, p<0.05) Jerry Springer (coefficient = 0.72, p<0.05) Loveline (coefficient = 0.67, p<0.05)	Gender Ethnicity TV viewing Adult drinking Adult approval of drinking Peer drinking Peer approval of drinking School grades Religiosity Parental monitoring Alcohol beliefs Deviance Impulsivity Playing sports Exposure to prevention programme	<u>Initiation of drinking</u> MTV (OR= 1.32, p<0.05) Jerry Springer (OR= 1.39, p>0.05) Loveline (OR= 1.72, p<0.05) <u>Frequency of drinking</u> MTV (coefficient = 0.10, p<0.05) Jerry Springer (coefficient = 0.26, p<0.05) Loveline (coefficient = 0.21, p<0.05)
Alcohol use in motion pictures	Sargent <i>et al.</i> (2006) US (New Hampshire and Vermont) 1999 10-14		Grade Gender Parental education School performance Self-esteem Maternal support Maternal control Rebelliousness Sensation seeking Smoking status	Exposure predicted use of alcohol during follow-up period (OR=1.15, 95%CI=1.06-1.25).
	Hanewinkel & Sargent (2008) Germany 2005 10-16 (Mean age 12.4)		Age Gender School socio-economic status Parental drinking pattern Parenting style Friend drinking School performance TV in bedroom TV watching time Sensation seeking/rebelliousness	Compared with quartile 1, the adjusted RRs (95% CI) for drinking without parental knowledge were 1.42 (1.16-1.74) for Q2, 1.94 (1.65-2.28) for Q3 and 2.0 (1.69-2.37) for Q4; and for binge drinking 1.44 (0.96-2.17) for Q2, 1.95 (1.27-3.0) for Q3, and 2.23 (1.48-3.37) for Q4.
	Wills <i>et al.</i> (2008) US 2003 10-14		Age Gender Ethnicity Parenting (maternal responsiveness and maternal monitoring) Rebelliousness Sensation seeking Self-regulation School performance	Movie alcohol exposure at baseline predicted alcohol use at 8 months (coefficient =0.1). Movie alcohol exposure between baseline and 8 months did not predict alcohol use at 8 months (coefficient =-0.03), but did predict alcohol

			Availability of alcohol at home Friend's use of alcohol Expectancy about alcohol Parental use of alcohol Parental education Family structure Family income Urbanicity Region	problems at 16 months (coefficient=0.13). Movie alcohol exposure between 8 and 16 months predicted alcohol use at 16 months (coefficient =0.08).
Radio	Collins <i>et al.</i> (2007) US (South Dakota) 2000 Grade 6 (11-12)		Gender Ethnicity Parental monitoring Adult drinking Peer drinking Parent approval Friend approval School grades Depressed mood Deviance Impulsivity Religiosity Sports participation Weekly TV viewing Parental education Grade 6 beer drinking	<u>Beer use</u> odds ratios (95%CI) = 1.17 (1.00-1.37).
Magazines	Ellickson <i>et al.</i> (2005) US (South Dakota) 1997 7 th grade (age 12-13)	Initiation of drinking (OR= 1.27, p<0.05) Frequency of drinking (coefficient = 0.21, p<0.05)	Gender Ethnicity TV viewing Adult drinking Adult approval of drinking Peer drinking Peer approval of drinking School grades Religiosity Parental monitoring Alcohol beliefs Deviance Impulsivity Playing sports Exposure to prevention programme	Initiation of drinking (OR=1.12, p>0.05), Frequency of drinking (coefficient = 0.10, p<0.05).
	Collins <i>et al.</i> (2007) US (South Dakota) 2000 Grade 6 (11-12)	Beer drinking in past year OR= 1.15, 95%CI= 1.06-1.26	Gender Ethnicity Parental monitoring Adult drinking Peer drinking Parent approval	Beer drinking in past year OR= 0.96, 95%CI = 0.87-1.06.

			Friend approval School grades Depressed mood Deviance Impulsivity Religiosity Sports participation Weekly TV viewing Parental education Grade 6 beer drinking	
Beer concession stands	Ellickson <i>et al.</i> (2005) US (South Dakota) 1997 7 th grade (age 12-13)	initiation of drinking OR= 1.31, p<0.05 Drinking frequency (coefficient = 0.22, p<0.05	Gender Ethnicity TV viewing Adult drinking Adult approval of drinking Peer drinking Peer approval of drinking School grades Religiosity Parental monitoring Alcohol beliefs Deviance Impulsivity Playing sports Exposure to prevention programme	Initiation of drinking (OR=1.42, p<0.05) Frequency of drinking (coefficient = 0.09, p<0.05).
	Collins <i>et al.</i> (2007) US (South Dakota) 2000 Grade 6 (11-12)	Beer drinking in past year OR= 1.27, 95%CI= 1.14- 1.41	Gender Ethnicity Parental monitoring Adult drinking Peer drinking Parent approval Friend approval School grades Depressed mood Deviance Impulsivity Religiosity Sports participation Weekly TV viewing Parental education Grade 6 beer drinking	Beer drinking in past year OR= 1.01, 95%CI = 0.91- 1.13
In store displays	Ellickson <i>et al.</i> (2005) US (South Dakota) 1997 7 th grade (age 12-13)	initiation of drinking OR= 1.36, p<0.05) Drinking frequency (coefficient = 0.11, p<0.05	Gender Ethnicity TV viewing Adult drinking Adult approval of drinking Peer drinking Peer approval of	initiation of drinking (OR=1.06, p>0.05) Frequency of drinking (coefficient = 0.0, p>0.05).

			drinking School grades Religiosity Parental monitoring Alcohol beliefs Deviance Impulsivity Playing sports Exposure to prevention programme	
	Collins <i>et al.</i> (2007) US (South Dakota) 2000 Grade 6 (11-12)	Beer drinking in past year OR= 1.25, 95%CI= 1.12-1.39	Gender Ethnicity Parental monitoring Adult drinking Peer drinking Parent approval Friend approval School grades Depressed mood Deviance Impulsivity Religiosity Sports participation Weekly TV viewing Parental education Grade 6 beer drinking	Beer drinking in past year OR= 1.03, 95%CI = 0.92-1.14.
Alcohol branded merchandise	Collins <i>et al.</i> (2007) US (South Dakota) 2000 Grade 6 (11-12)	Beer drinking in past year OR= 3.54, 95%CI= 2.55-4.90	Gender Ethnicity Parental monitoring Adult drinking Peer drinking Parent approval Friend approval School grades Depressed mood Deviance Impulsivity Religiosity Sports participation Weekly TV viewing Parental education Grade 6 beer drinking	Beer drinking in past year OR= 1.76, 95%CI= 1.23-2.52
	Fisher <i>et al.</i> (2007) US 1998-1999 11-18		Age Pubertal status Race Geographical area Social self-esteem Athletic self-esteem Global self-esteem Scholastic self-esteem Cigarette smoking Family composition	OR (95% CI) <u>alcohol initiation</u> <u>Girls</u> 1.74 (1.37-2.19) <u>Boys</u> 1.78 (1.36-2.33) <u>Binge drinking</u> <u>Girls</u> 1.79 (1.16-2.77) <u>Boys</u>

			Family dinner at home Adults drink at home Siblings <21 drinking Peer drinking Attitudes and beliefs about alcohol consumption	0.87 (0.51-1.48)
	McClure <i>et al.</i> (2008). Same sample as Wills <i>et al.</i> (2008) above. US 2003 10-14		Age Gender Ethnicity Susceptibility to alcohol use (response to peer offers, intentions and positive expectancies) Exposure to movie alcohol use Peer drinking Parent drinking Alcohol availability at home Sensation seeking Rebelliousness Parenting (maternal responsiveness and maternal monitoring) Extracurricular activities School performance TV viewing length of time Parent report education Household income	Ownership of ABM at baseline did not have a significant direct impact on alcohol initiation at 8 months (HR=1.41, 95% CI 0.98-2.01), nor on alcohol initiation between 8 and 16 months (HR=1.57, 95% CI=0.99-2.5), but did on initiation of binge drinking at 8 months(HR=1.80, 95% CI=1.28-2.54), but not initiation of binge drinking between 8 and 16 months (HR= 1.44, 95% CI=0.90-2.31). New ownership of ABM at 8 months had a significant direct impact on alcohol initiation at 16 months (HR=2.31, 95%CI=1.6-3.35) and initiation of binge drinking at 16m (HR=2.22, 95%CI=1.49-3.32).
Outdoor advertisements	Pasch <i>et al.</i> (2007) US (Chicago) 2003 Mean age 12.2 years		Gender Ethnicity School socio-economic status Exposure to other forms of alcohol advertising Awareness of outdoor advertising Prevention programme	Exposure to alcohol advertisements at 6 th grade did not predict alcohol behaviour amongst 6 th grade alcohol users and non-users at 8 th grade. [But, amongst 6 th grade non-users, exposure did predict 8 th grade intentions to use (e.g., "do you think you will be drinking alcohol in the next month"), f=6.29, p=0.01 and outcome expectancies, f=4.62, p=0.03.

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Annex I

**Task Request
for the Science Group
of the European Alcohol and Health Forum
regarding scientific advice on:**

The impact of marketing communication on the volume and patterns of consumption of alcoholic beverages, especially by young people

Background

On 24 October 2006 the European Commission adopted *an EU strategy to support Member States in reducing alcohol related harm*, which aims at addressing 'the adverse health effects related to harmful and hazardous alcohol consumption'.⁷ In this document five priority themes are identified, which are relevant in all Member States and for which Community action in compliment to national policies and coordination of national policies has an added value:

- 1) protect young people, children and the unborn child;
- 2) reduce injuries and deaths from alcohol-related road traffic accidents;
- 3) prevent alcohol-related harm among adults and reduce the negative impact on the workplace;
- 4) inform, educate and raise awareness on the impact of harmful and hazardous alcohol consumption, and on appropriate consumption patterns;
- 5) develop, support and maintain a common evidence base.

Marketing communication is a controversial issue in discussions about effective actions and policies to curb the adverse health and social effects of alcohol consumption. Pleas for legal restrictions or bans of alcohol marketing communication presuppose a clear impact of marketing communication on the volume of alcohol consumption and, as a consequence, on harmful and hazardous alcohol consumption, especially by young people. At the same time, this assumption is challenged by a number of stakeholders.

During the second meeting of the European Alcohol and Health Forum's Task Force on Marketing Communication, and at the preceding workshop (4/5 March 2008), these opposing views regarding the impact of marketing communication on the volume and patterns of consumption of alcoholic beverages were clearly expressed.

From the discussions and presentations at the above meetings, the Chair of the Task Force concluded, amongst other things:

⁷ COM(2006) 625 final.

- that the relation between marketing exposure and volume demand is 'complex';
- that 'DG SANCO's working hypothesis is that the balance of evidence shows a cumulative effect of marketing on young people's knowledge, attitudes and behaviour'.

The Task Force recommended to the Forum the preparation of a Task Request for the Science Group to further analyse the relation between marketing communication for alcoholic beverages and drinking attitudes and patterns of young people. The Forum agreed to this recommendation.

Terms of Reference

The European Alcohol and Health Forum requests the Science Group to provide an in-depth analysis of the relationship between marketing communication and the volume and patterns of consumption in general, and the volume of alcohol consumption of young persons in particular. Marketing techniques using new media (internet, mobile phones/sms...) should be included in this analysis.

The Science Group should base its analysis on a review of existing data, literature and research.

The analysis of the Science Group should be limited to determining the relationship referred to above, and should not include advice on policy options.

References

In order to prepare its analysis the Science Group may use all existing sources as deemed appropriate. In this context, attention of the Science Group is drawn to the presentations and other documents made available in the framework of the meetings of the Task Force on Marketing Communication, which can be accessed at the following web site:

http://ec.europa.eu/health/ph_determinants/life_style/alcohol/Forum/alcohol_forum_en.htm.

In addition, the members of the Forum's Task Force on Marketing Communication may submit to the secretariat of the Science Group electronic versions or hyperlinks of publications which they think are highly relevant for the Science Group to carry out its task.

Annex II

Summary of individual studies Task request

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

Country:
New Zealand

Baseline survey data:
1985/1986

Age groups:
13 years old - initial baseline age
15 years old – intermediate baseline age
18 years old – final follow-up age

Study objective:
To explore relationships between alcohol consumption at age 18 years and earlier recall of alcohol in mass media including commercial advertising, moderation messages and alcohol portrayals in entertainment messages.

Sample:
Cohort of children born in 1972 in middle size town in New Zealand. Initial cohort – 1661. A size of final sample was 667 consisted of all who participated in the study at age 13, 15 and 18. Number of participants who remained in final model – 485 (males – 251, females – 184)

Study design:
Prospective cohort study. Measurement of exposure to alcohol related messages in mass media at age 13 and 15. Measurement of alcohol consumption at age 18.

Survey method:
The data on alcohol related media messages were collected in face-to-face interviews at ages 13 and 15. Open questions were asked on commercial advertising, moderation messages and alcohol portrayals in entertainment messages. At age 18 quantitative information on alcohol use was collected by self-administer computer questionnaire in a face-to-face interview. Participants were to give information on typical and maximum amount of alcohol consumed at a number of different drinking locations and on frequency of drinking in these locations.

Baseline sample size:
Not given.

Follow-up (months)
60 and 36 months

Follow-up rate:
Not given.

Analysis:
Multiple regressions were carried out to investigate associations between alcohol-related media exposure at younger ages and alcohol consumption at age 18. Separate regression models were produced for men and women as well as for beer on the one hand and spirits and wine combined together. Media related variables included number of commercial advertisements, number of moderation messages and number of portrayals in entertainment messages as well as number of hours TV watched per week at age 13 and 15.

Co-variates/confounders:
Demographic variables including socio-economic status, living situation, current occupation (students, employed, unemployed), peer approval of people who drink.

Out-come at follow-up:
Out of many associations investigated very few showed positive associations with alcohol consumption. Nevertheless, number of commercial ads seen by a boy at age 15 predicted strongly both average and maximum amount of his beer consumption at age 18. As for girls the only predictor of both beer and spirits/wine consumption was a general TV exposure measured by a number of hours at TV at age 13 and 15.

Article: 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.

Country:
New Zealand

Baseline survey data:
1990/1991

Age groups:
18 years old - baseline age
21 years old – final follow-up age

Study objective:
To test hypothesized model of the effect of alcohol TV advertising and allegiance to specific brands of beer on subsequent self-reported beer consumption and self-reported aggressive behaviour linked with drinking.

Sample:
Cohort of children born in 1972 in middle size town in New Zealand. Initial cohort – 1661. A size of sample at age 18 – 921 and at age 21 – 942. Final sample, consisted of those who drank beer at age 18, was 630.

Study design:
Prospective cohort study. Measurement of liking of alcohol and brand allegiance at age 18. Measurement of beer consumption (volume) and alcohol-related aggression at age 21.

Survey method:
Questions about alcohol including its consumption and related aggression were responded in a computer based questionnaire and supplemented by a face-to-face interview.

Baseline sample size:
630

Follow-up (months)
36 months

Follow-up rate:
Not given.

Analysis:
Structural equation modelling with standardised solution was applied to assess the fit between empirical data and hypothesised model based on theoretical assumptions.

Liking of alcohol advertising was measured by three items:

“alcohol advertisements have plenty of action” (from strongly agree to strongly disagree),

“alcohol advertisements show the type of people I admire” (from strongly agree to strongly disagree),

“comparing alcohol adverts generally with other ads, which of the following do you mostly agree with?” (from like a lot more to like a lot less).

Brand allegiance was measured by a question on a favourite brand.

To measure beer consumption participants were to give information on typical and maximum amount of beer consumed at a number of different drinking locations and on frequency of drinking in these locations.

And finally, aggression was indicated by responses to three questions:

“been told to leave the place because your drinking”,

“got into physical fight because of your drinking”,

“been involved in a serious argument after having been drinking”.

Co-variables/confounders:
Consumption of beer at age 18 and gender.

Out-come at follow-up:
The final structural equation model confirmed the hypothetical model to a large degree. Significant paths were identified from liking advertising and brand allegiance at age 18 to a volume of beer consumption at age 21. Against hypothesised assumption on a reciprocal impact of beer consumption on liking beer adverts such an association was not found significant in the model at a baseline age of 18 years old. Beer consumption at age 18 and 21 was found to be linked with aggression at age 21. The model explained 57% of the variance in the alcohol-related aggression justifying a claim that advertising, if liked by young people, may lead to higher beer consumption which in turn increases a risk of aggression associated with drinking.

Article: Casswell, S., Pledger, M. & Prata, S. (2002) Trajectories of drinking from 18 to 26 years: identification and prediction. *Addiction*, 97, 1427-1437.

Country:
New Zealand

Baseline survey data:
1990/1991

Age groups:
18 years old - baseline age
26 years old – final follow-up age

Study objective:
To identify developmental trajectories of drinking between the ages of 18 and 26 years and to identify variables, amenable to policy influences, which predict these trajectories. Those variables included ease of access to alcohol at age 15, access to licensed premises at 18 and liking alcohol advertising at 18.

Sample:
Cohort of children born in 1972 in middle size town in New Zealand. Initial cohort – 1661, at age 3 – 1037, at age 18 - 993 (baseline), at age 21 – 992, at age 27 – 980.
Alcohol section of the study was responded by 921 respondent at age 18, 942 – at age 21 and 933 at age 26 of which 799 participated in all three.

Study design:
Prospective cohort study from 18 to 26 years, measurement of frequency and quantity of alcohol consumption every two years. Measuring of liking of alcohol advertising at baseline only (18 years old).

Survey method:
The data on alcohol use were collected by self-administer computer questionnaire and a face-to-face interview. As for response to advertising, respondents were asked how much they liked adverts related to alcohol.

Baseline sample size:
N = 993, including 921 responding alcohol section of the study.

Follow-up:
96 months (8 years)

Follow-up rate:
799/921 = 87%

Analysis:
A latent class mixture modeling approach was applied to determine the gender-specific trajectories of drinking that considered frequency and typical quantities consumed separately. Logistic regression was used to identify variables which predict membership in different trajectories groups. Those explanatory variables included ease of access to alcohol and access to licensed premises at younger ages as well as liking of alcohol advertising.

Covariates/confounders:
Living arrangements at age 18 (living with both parents, one parent, partner or flatmate),
Parental consumption,
Level of education,
Age of onset of regular drinking.

Outcomes at follow-up:
Four trajectories of typical quantity per occasion were identified for both male and female respondents. For over 90% of men a consumption peak was at age 21 to decline with growing age. For a small group of 4% participants, however, the trajectory of per occasion consumption tended to increase from about 200 ml of absolute alcohol at age 21 to over 600 ml at age 26. Similarly, among women one small group of 6% participants increased its consumption from less than 100 ml at age 21 to well over 600 ml at 26. For men five variables were selected into the final model predicting membership in different trajectories groups of which access to licensed premises at age 18 (the higher access the higher chance to be in the higher trajectory group) and educational achievements (membership in higher trajectory group being associated with lower education) were highly significant. Liking alcohol advertising was not even included into the final model. For women five variables too found their way into the final model of which drinking in licensed premises and at age 18 and easy access to alcohol at age 15 proved to be highly significant. Liking alcohol advertising was not included into the final model either. As far as annual drinking frequency is concerned three trajectories were found for each gender. For men one trajectory of relatively low frequency composed of 7% of respondents remained stable across time while two other trajectories of higher frequency showed a linear increase. For women, two groups constituting 91% of all respondents showed a linear increasing frequency over time while frequency of consumption in one small group remained stable. In models predicting men's frequency of drinking five variables were selected into the final model showing high significance of access to licensed premises, early initiation to drinking and, mother's frequency of alcohol consumption. Liking advertising was marginally significant (OR 1.6, p=0,07) suggesting, however, that those more fond of alcohol ads at

younger age were more likely to become a member of higher trajectory group. The latter association was not confirmed in female respondents as liking advertising was not even selected for the final model.

Article: Snyder L. B., Milici F. F., Slater M., Sun H., Strizhakova Y. (2006) Effects of alcohol advertising exposure on drinking among youth. *Arch Pediatr Dolec Med.* 160, 18-24.

Country:

USA

Baseline survey data:

1999

Age groups:

15-26

Study objective:

To test whether alcohol advertising expenditures and the degree of exposure to alcohol advertising affect alcohol consumption by youth.

Sample:

Twenty four media markets were systematically sampled from the top 75 media markets representing 79% of the US population. Households within 24 media markets were systematically sampled from a list of randomly selected households with telephones. Within a household a young person aged between 15 and 26 with the most recent birthday was selected. In effect, a random sample of young people aged 15 to 26 years was obtained for the study.

Study design:

Longitudinal panel was applied with four waves of interviews within 21 months. Focus of interviews was on past month alcohol consumption and advertising exposure. Last month consumption was estimated by multiplying drinking frequency by a sum of typical and maximum volume per occasion divided by 2. Last month advertising exposure was self-assessed for four major media (television, radio, magazines and billboards) and two drink categories (beer and liquors including pre-mixed drinks).

Advertising exposure was also measured in more objective terms calculating per inhabitant expenditures for alcohol advertising in each market.

Survey method:

Random sample of youth aged 15-26 years were interviewed 4 times during 21 month between 1999 and 2001

Baseline sample size:

1872 with 24% refusal rate.

Follow-up after seven months:

1173

Follow-up after 14 months:

787

Follow-up after 21 month:

588

Follow-up rate:

588/1872 – 31%. Those who dropped out tended to be slightly older, less likely to be in high school, less likely to live at home, and tended to drink more alcohol at baseline.

Analysis:

Multi-level modelling was used to handle the repeated-measures design and to incorporate ecological variables (per capita advertising expenditures and aggregate alcohol sales). Three levels of analysis were distinguished: observations in four survey waves (4418), individuals (1858), markets (24). The model examined impact of advertising on alcohol consumption on three levels: differences within individuals over time, differences between individuals, market-level differences in advertising expenditures.

Co-variates/confounders:

Age, gender, ethnicity, high school or college enrolment, and alcohol sales

Out-come at follow-up:

The study identified high variation in alcohol advertising expenditures per month ranging from 0.20 USD to 17.3 USD per capita in different media markets as well as in self-reported exposure from several to over 50 exposures per month. Those variations corresponded with differences in drinking levels and with their changes over time. The study shows that advertising expenditures and advertising exposure have impact on drinking levels and changes in drinking over time. For every additional dollar spent on advertising per inhabitant, individuals consumed 3% more drinks per month (event rate ratio 1.03, 95% CI 1.01-1.05) (holding other factors constant). For markets with high advertising expenditures per inhabitant, growth in drinking over time was steeper and continued until older age. In markets with low per inhabitant expenditures growth in consumption was slower and levelled off or even decline above age 21 years. As far as self-reported exposure is concerned the study concludes that "holding other factors constant, individuals who saw 1 more advertisement than other individuals had 1% more alcoholic drinks per month (event rate ratio 1.01, 95% CI 1.01-1.02)". An additional analysis undertaken for youth below 21 years old showed similar associations in spite of alcohol ban for that fraction of the US population.

Article: Henriksen, L., Feighery, E.C., Schleicher, N.C., Fortmann, S.P.: Receptivity to Alcohol Marketing Predicts Initiation of Alcohol Use. *Journal of Adolescent Health*, 42, 28-35, 2008.

Country

USA (California)

Baseline survey date

February – April 2003

Age group (years)

From 10 to 14 years old at baseline surveys (6th to 8th graders) and from 11 to 15 years old after one year follow-up (7th to 9th graders)

Study objective

This study examined the influence of alcohol advertising and promotions on the initiation of alcohol use.

Sample

Out of 2 728 eligible students at baseline 394 students did not returned consent forms, 114 returned negative consent forms, and 95 were absent during data collection. Completed baseline sample consisted of 2 125 students (78%).

The analysis sample (n=1 080) was composed of never drinkers at baseline, who were not missing follow-up data regarding alcohol use.

Study Design

Prospective school survey with 12 months follow-up. Measurement of advertising exposure at baseline and onset of drinking after one year follow-up

Survey method

In-school paper- and- pencil questionnaire – self reported data at baseline and at follow-up.

Measures of alcohol marketing receptivity (two close-ended questions about alcohol branded promotional items, like T-shirt, matches, sunglasses with the brand name; and one open-ended about advertising – “what is the brand name of your favourite alcohol advertisement?”)

Brand recall (list of max. 7 brand names)

Brand recognition (brand ads with removed names were displayed)

Baseline sample size

2 728 students eligible. Completed baseline sample consisted of 2 125 students (78%).

Follow-up (months)

Twelve month follow-up

Follow-up rate

Retention at follow-up was 72%.

Analysis

Chi-square, T tests, and F tests were used for the analysis of attrition effects.

Ordinal logistic regression to predict alcohol use (abstinent, initiated but not current use, current drinker).

Covariates/ confounders analysed

Parent and peer alcohol use

School performance

Risk taking

Being unsupervised after school

Perceived prevalence (using 10 point scale to estimate the percentage of their peers and high school students who drink at least once a week)

Peer norms (4 point scale to assess peer attitude to drinking)

Outcome at follow-up

At baseline, 29% of never drinkers either owned or wanted to use an alcohol branded promotional item (high receptivity); 12% named the brand of their favourite alcohol ad (moderate receptivity), and the rest of 59% were not receptive to alcohol marketing. At follow-up 29% of baseline never drinkers reported any alcohol use ; 13% reported drinking at least 1 or 2 days in the past month. Those 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 to alcohol marketing at baseline.

Article: Stacy, A., Zogg, J., Unger, J., Dent, C. Exposure to Televised Alcohol Ads and Subsequent Adolescent Alcohol Use. *American Journal of Health Behavior* 28(6): 495 – 509, 2004.

Country
United States

Baseline Survey Date
Spring 2000

Age group (years)
Seventh grade students; Average age was 12.5 years at baseline

Study objective
To assess the impact of televised alcohol commercials on adolescents' alcohol use

Sample
Baseline included 2998 seventh graders from Los Angeles area schools; Analytic sample includes 75% responding to follow-up (n=2250) Analytic sample was 51% female; Analytic sample was 55% Hispanic; 19% Asian; 14% Non-Hispanic white; 2% African-American; 10% other Ethnic distribution is close to distribution of LA Public Schools

Sample selection
Schools were selected at random from a list of all public schools in LA County. All seventh-grade students in selected schools were invited to participate; Fewer than 3% of students/parents declined to participate

Study design
Prospective cohort study

Survey method
Students completed a paper-based questionnaire in school during regularly-scheduled classes; Two versions of the test (differing by one section containing alternate versions of ad-recall memory exercises) were randomly distributed to students;

Baseline sample size
2998 students in 20 middle schools

Baseline measures

Measures of advertising exposure:

TV watching index
TV sports watching index
Self-report of frequency of exposure to alcohol advertising
Memory-based cued recall of alcohol advertising
Draw-an-event memory test

Measures of alcohol use:

Current alcohol use
Prior alcohol use

Measures of confounders:

General television viewing frequency
Participation in team sports
Perceived friend/peer alcohol consumption
Perceived peer approval of alcohol consumption
Alcohol consumption intentions
Perceived adult alcohol consumption
Ethnicity
Gender
School site

Follow-up (months)
twelve months

Follow-up rate
All in baseline sample were invited; 2250 students participated (75%). Follow-up group comprises sample for analysis

Analysis

Logistic regression models
Unadjusted model: predicted eighth-grade alcohol use from each of seventh-grade advertising exposure measures alone;
Adjusted model: predicted eighth-grade alcohol use from seventh-grade advertising exposure, prior use, and confounders analyzed;
Third set of models examined two-way interactions between exposure and prior alcohol use, gender, and ethnicity.

Covariates / confounders analyzed

General television viewing frequency
Participation in team sports
Perceived friend/peer alcohol consumption
Perceived peer approval of alcohol consumption
Alcohol consumption intentions

Perceived adult alcohol consumption
Ethnicity
Gender
School site

Outcomes at follow-up

Measured predictive value on beer use, wine/spirits use, and 3-drink episodes; In the adjusted model, the following had a statistically significant predictive effect on eighth-grade alcohol use (95% of CI does not include 1.0):
Watched TV shows (for all beverage types and for 3-drink episode experience; OR ranged from 1.26 to 1.44)
Watched TV sports (for beer use only, OR 1.2)
Self-reported frequency of exposure (beer use only, OR 1.21)

Article: Ellickson, P., Collins, R., Hambarsoomians, K., McCafrey, D.: Does alcohol advertising promote adolescent drinking? Results from a longitudinal assessment. *Addiction*, 100, 235-246, 2005.

Country

USA (South Dakota)

Baseline survey date

Autumn 1997

Age group (years)

Seventh-graders (13 years old on average?) – followed until ninth grade (15 years old on average?). No detailed age information offered.

Study objective

To examine the relationship between exposure to different forms of alcohol advertising and subsequent drinking among adolescents. To assess whether exposure to an alcohol and drug prevention program mitigates any such relationship.

Sample

Sample consisted from two groups: seventh-grade non-drinkers (n=1 206), and seventh-grade drinkers (n=1 905) from 41 middle schools in South Dakota. This final analysis sample of 3 111 adolescents was 50% female, 88% white, 6.3% of Native Americans and 5,4% other race/ethnicity.

Study Design

Prospective school survey of 7th grade abstainers and drinkers. Advertising exposure measured at 8th grade and subsequent drinking at 9th grade. Additionally impact of an intervention program was tested.

Survey method

In school paper-and-pencil survey. To increase response rates make-up class survey sessions and mailed surveys were conducted.

Baseline sample size

A total of 3 780 seventh-graders out of which 3 111 were included in final analyses after drop-outs and missing values in outcome measures were eliminated.

Follow-up (months)

Twelve month from initial sampling to a survey on advertising exposure and next 12 months to a survey on outcome measures (onset of drinking and drinking frequency).

Follow-up rate

Of the 3 780 eligible students 484 (12,7%) failed to complete a survey at one or more of the three data points and were excluded from the study. An additional 184 (4,9%) were excluded because they had a missing value for at least one of the outcome variables.

Analysis

Groups of drinkers and non-drinkers were analysed separately

Series of logistic regressions were conducted to examine the relationship between exposure to advertising in grade 8th and subsequent drinking in grade 9th.

Covariates/ confounders analysed

Age and gender

Television habits

Other drinking predictors (e.g. adult and peer drinking, weak bond with family, impulsivity, beliefs about alcohol consequences)

Social context (drinking by most important adult, parental approval to drink)

Attitudes and behaviour and demographic variables

Outcome at follow-up

For 7th-grade non-drinkers, exposure to in-store beer displays predicted drinking onset by grade 9; for seventh-grade drinkers, exposure to magazines with alcohol advertisements and to beer concession stands at sports 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 analyses. Participation in the prevention program ALERT Plus, reduced future drinking for both groups and counteracted the effect of in-store beer displays.

Article: Collins, R., Ellickson, P. L., McCaffrey, D., Hambarsoomians, K.: Early Adolescent Exposure to Alcohol Advertising and Its Relationship to Underage Drinking. *Journal of Adolescent Health*, 40: 527-534, 2007

Country

USA (South Dakota)

Baseline survey date

2001

Age group (years)

6th grade students at the baseline (average age = 11,8 years)

7th grades at the follow up

Study objective

To determine whether early adolescents who are exposed to alcohol marketing are subsequently more likely to drink.

Sample

Sampling methods are not sufficiently described. It can be deduced from the paper that respondents were recruited from South Dakota elementary schools located in a number of districts representing different levels of urbanisation, including rural areas. The districts were selected for a purpose of an earlier school prevention evaluation study. As can be calculated from the paper 43 schools were approached of which 39 (90%) were enrolled. The paper does not offer any information how the students in individual schools were recruited or sampled (sampling of classes or individual students?). Eventually 1959 students were enrolled at grade 5th but not studied at that age. After one year and then two years 91% of them (1786) completed additional surveys and therefore were eligible for the present study. Respondents: 85% white, 12% Native Americans, 3% other race; 51% girls.

Study Design

Prospective school survey with one year follow-up. Measurement of advertising exposure measured at grade 6. Measurement of past year beer drinking, and drinking intentions at grade 7.

Survey method

According to the paper "surveys were administered in class". It seems that self-administered questionnaires were applied to measure media exposure as well as beer drinking and intentions to drink.

Follow-up (months)

One year (12 months)

Follow-up rate

From 1 959 students of original sample at grade 5, 91% completed additional surveys at both grades 6 and 7 (n = 1 786). No information was given what was attrition rate between grade 6 and 7.

Small amounts of missing data on the outcomes resulted in final samples of 1 699, and 1 740 youth for predicting drinking and drinking intentions, respectively.

Analysis

"Bivariate associations were estimated using logistic regression (for beer drinking) and ordered logit (for alcohol intentions)." (p. 530)

"Full multivariate analyses employed logit and logistic regression, separately regressing each outcome variable simultaneously on all possible predictors." (p. 530)

Covariates/ confounders analysed

Low parental monitoring, adult drinking, peer drinking

Parent approval, peer approval, low school grades

Depressed mood, deviance, impulsivity, low religiosity

Outcome at follow-up

„After adjusting for covariates, the joint effect of exposure to advertising from all six sources at grade 6 was strongly predictive of grade 7 drinking and grade 7 intention to drink.

Youth in the 75th percentile of alcohol marketing exposure had predicted probability of drinking that was 50% greater than that of youth in the 25th percentile.

Article: Robinson, T.N., Chen, H., Killen, J.D.: Television and Music Video Exposure and Risk of Adolescent Alcohol Use. *Pediatrics*, 1998;102;54- (<http://www.pediatrics.org/cgi/content/full/102/5/e54>)

Country

USA (California)

Baseline survey date

October – November 1994

Age group (years)

9th graders (average age at baseline = 14,6 years)

Study objective

To examine prospectively the associations between exposure to media portrayals of alcohol use and drinking in adolescents, including onset of drinking.

Sample

Students from six public high schools in California were initially involved in the study (details of school sampling are not given). Of 2777 students from 9th grade eligible to participate 2609 (94%) were included into baseline survey.

Study Design

Prospective cohort survey with 18-month follow-up. Measurement of media exposure and drinking status at baseline (9th grade), measurement of onset of drinking and current drinking at 10th grade

Survey method

In school paper-and-pencil survey. Self-reports on hours of media use (reported separately for “a usual school day” and “a usual weekend day”), including watching TV, watching videos, playing computer or video games, and watching music videos, like MTV, VH-1 or rental music videos.

Self-reports on alcohol use – one on lifetime prevalence, one on 30 days prevalence

Baseline sample size

3 194 students from 9th grades in the 6 high schools were eligible

2 609 students participated at the baseline assessments (others excluded because of not-attending mainstream classes and limited English language proficiency)

Follow-up (months)

April – May 1996 (18 months)

Follow-up rate

Of participating students at baseline, 1 583 (61.0%) also participated in follow-up evaluation 18 months later.

Additionally 75 students were excluded from the analysis because of inconsistent responses on reports of alcohol use, hence follow-up was carried out with 1 533 students (58%)

Analysis

Multiple logistic regression was used to examine associations between media exposure and subsequent alcohol use.

Covariates/ confounders analysed

Baseline initial levels of outcome measures, including drinkers versus non-drinker status

Gender

Ethnic distribution

Outcome at follow-up

Among adolescents, who were drinkers, 50.7% have continued drinking. No significant associations between baseline media use and maintenance of drinking over a subsequent 18 months were found. Increased television and music video viewing are risk factors for the onset of alcohol use in adolescents. Among non-drinkers at baseline hours of TV, music, video, and VCR video viewing were all independently associated with the subsequent onset of drinking. The odds ratios indicated that, controlling for the effects of age, sex, ethnicity, and other media use, each increase of 1 hour per day of TV viewing was associated with a 9% average increased risk of starting to drink alcohol during the next 18 months, each increase of 1 hour per day of music video viewing was associated with a 31% average increased risk of starting to drink alcohol during the next 18 months. Computer and video game use was not significantly associated with onset of drinking.

Article: Van Den Bulck, J. & Beullens, K. **Television and Music Video Exposure and Adolescent Alcohol Use While Going Out.** *Alcohol and Alcoholism*, 40(3): 249-253, 2005.

Country
Belgium

Baseline Survey Date
February 2003

Age group (years)
First- and fourth-year secondary school students; Average age of first-years: 13.11 – 13.23 years (female / male); Average age of fourth-years: 16.30 – 16.46 years (female / male)

Study objective
To examine predictive value of television or video viewing on alcohol consumption when going out among secondary school students.

Sample
Used data from existing study (Leuven Study on Media and Adolescent Health. 3022 first- or fourth-year students were invited to take part; 125 were sick or absent; others excluded due to being informed of the true nature of the study (other students had been told it was a general-interest project on adolescents' leisure time), final sample n=2546 for first survey. Analysis performed on survey results for 1648 students; Respondents were 55% male, 45% female; 52% first-year and 48% fourth-years.

Sample selection
Respondents to survey were from 15 secondary schools in Flemish community in Belgium. Schools selected randomly from list of schools in Flanders; If schools agreed to cooperate with study, all first- and fourth-year students were included in sample; this selection process was repeated until 3000 students were included; Analysis performed only on 1648 students participating in both waves of survey

Study design
Longitudinal prospective cohort design

Survey method
Standardized, self-administered questionnaire in an assembly setting. Students were told that the study was “an omnibus study on the leisure habits of Flemish youngsters”

Baseline sample size
2546 participants at baseline

Baseline measures
Music video exposure was measured as an item in a long list of television content types (rated from never up to “nearly every day”)
Television viewing volume (time in hours per week and per hour)
Quantity of alcohol consumed when going out (measured both at baseline and at follow-up) based on self-report
Pubertal status
Smoking status (based on self-report)
Gender and school year

Follow-up (months)
February 2004 (12 months)

Follow-up rate
Two schools declined to participate in second wave (representing 323 students)
572 who completed 2003 survey were lost due to absence or changing schools;
642 students participated only in the 2004 survey
1648 students completed both; only their data is included in analysis

Analysis
A multiple regression was performed to identify best predictors of alcohol consumption.
A residual model was used to control for initial values of dependent variables in analysis.

Covariates / confounders analyzed

Initial levels of outcome measures, including alcohol consumption;	School years
Gender	Smoking status
	Pubertal status

Outcomes at follow-up
Older students drank more than younger students;
Fifth-year boys drank significantly more than girls in the same group;
Gender, school year, smoking status, and pubertal status were significant predictors of alcohol consumption when going out;
Television viewing volume and music video exposure are positively related to alcohol consumption; this is statistically significant.

Article: Sargent JD, Wills TA, Stoolmiller M, Gibson J, Gibbons FX: Alcohol use in motion pictures and its relation with early-onset teen drinking. *J Stud Alcohol* 2006, 67(1):54-65.

Country

US (New Hampshire and Vermont)

Baseline survey date

1999

Age group (years)

10-14

Study objective

Impact of exposure of alcohol use in motion pictures on initiation of alcohol use.

Alcohol marketing & media exposure

Exposure to US box-office hit movies content-coded for on-screen alcohol use (consumption, implied possession and purchase of alcohol).

Drinking behaviour outcome measure

Initiation of alcohol drinking (unknown to parents).

Sample/ Study Design

Randomised cross sectional survey with longitudinal follow up on non drinkers at baseline in 15 middle schools

Survey method

Paper survey, with follow-up telephone interview

Baseline sample size

3577 non-drinkers

Follow-up (months)

12-26 (average 17 months)

Follow-up rate

2406/3577 (67%)

Analysis

Multi-level logistic regression to calculate ORs adjusted for covariates

Covariates/ confounders analyzed

Grade
Gender
Parental education
School performance
Self-esteem
Maternal support
Maternal control
Rebelliousness
Sensation seeking
Smoking status

Outcome at follow-up

357/2406 (15%) initiated drinking alcohol. Exposure predicted use of alcohol during follow-up period (OR=1.15, 95%CI=1.06-1.25). Analysis with quadratic exposure effect (OR=0.996, 95%CI=0.992-0.999) showed that the relationship between exposure of alcohol use in motion pictures and initiation of alcohol use was stronger among adolescents in lower exposure categories.

Article: Hanewinkel, R. and Sargent, J.D. (2008). Longitudinal study of exposure to entertainment media and alcohol use among German adolescents. *Pediatrics*. In press.

Country
Germany

Baseline survey date
2005

Age group (years)
10-16 (Mean age 12.4)

Study objective
Influence of exposure to alcohol use in movies on initiation of alcohol use.

Alcohol marketing & media exposure
Exposure to Germany's box-office hit movies content-coded for on-screen alcohol use (consumption, implied possession and purchase of alcohol) including viewing on TV, DVD and video.

Drinking behaviour outcome measure
Initiation of alcohol drinking (unknown to parents); ever binge drinking (≥ 5 drinks in a row within 2 hours).

Sample/ Study Design
Random selection of 42 schools of which 27 secondary schools participated in Schleswig-Holstein, a State of Germany; 85% of all 5-9th grade students surveyed

Survey method
Paper survey

Baseline sample size
3432 never drinkers

Follow-up (months)
12-13 months

Follow-up rate
2708/3432 (79%)

Analysis
Generalized linear models using log link, adjusted for clustering

Covariates/ confounders analyzed
Age
Gender
School socio-economic status
Parental drinking pattern
Parenting style
Friend drinking
School performance
TV in bedroom
TV watching time
Sensation seeking/rebelliousness

Outcome at follow-up
Estimated mean movie alcohol exposure was 3.2 hours, subsequently divided into 4 quartiles. 33% of students initiated drinking without parental knowledge and 14% binge drinking (5 or more drinks within 2 hours). Compared with quartile 1, the adjusted RRs (95% CI) for drinking without parental knowledge were 1.42 (1.16-1.74) for Q2, 1.94 (1.65-2.28) for Q3 and 2.0 (1.69-2.37) for Q4; and for binge drinking 1.44 (0.96-2.17) for Q2, 1.95 (1.27-3.0) for Q3, and 2.23 (1.48-3.37) for Q4.

Article: Wills, T.A., Sargent, J.D., Gibbons, F.X., Gerrard, M., Stoolmiller, M. (2008). Movie exposure to alcohol cues and adolescent alcohol problems: a longitudinal analysis in a national sample. *Psychology of Addictive Behaviors*. In Press.

Country
US

Baseline survey date
2003

Age group (years)
10-14

Study objective
Influence of exposure to alcohol use in movies on ever use of alcohol, binge drinking and alcohol-related problems.

Alcohol marketing & media exposure
Exposure to US box-office hit movies content-coded for on-screen alcohol use (consumption, implied possession and purchase of alcohol).

Drinking behaviour outcome measure
Initiation of alcohol drinking (unknown to parents); ever binge drinking (≥ 5 drinks in a row); recent binge drinking; whether experienced problems caused when someone drinks alcohol.

Sample/ Study Design
Random longitudinal digit dial telephone survey of adolescents aged 10-14 years

Survey method
Telephone survey with computer-assisted telephone-interviewing procedure

Baseline sample size
6522

Follow-up (months)
8, 16, and 24

Follow-up rate
5503/6522 (84%) at 8 months; 5019 (77%) at 16 months; 4574 (70%) at 24 months

Analysis
Structural equation modelling analysis

Covariates/ confounders analyzed
Age
Gender
Ethnicity
Parenting (maternal responsiveness and maternal monitoring)
Rebelliousness
Sensation seeking
Self-regulation
School performance
Availability of alcohol at home
Friend's use of alcohol
Expectancy about alcohol
Parental use of alcohol
Parental education
Family structure
Family income
Urbanicity
Region

Outcome at follow-up
Viewed alcohol use in movies averaged 31 minutes at baseline, 35 minutes at 8 months, 30 minutes at 16 months. Movie alcohol exposure at baseline predicted alcohol use at 8 months (coefficient =0.1). Movie alcohol exposure between baseline and 8 months did not predict alcohol use at 8 months (coefficient =-0.03), but did predict alcohol problems at 16 months (coefficient=0.13). Movie alcohol exposure between 8 and 16 months predicted alcohol use at 16 months (coefficient =0.08). At all times, alcohol use predicted alcohol problems and there were significant indirect and independent effects of movie exposure at baseline, 8 and 16 months on alcohol problems at 24 months.

Article: McClure, A.C., Stoolmiller, M., Tanski, S.E., Worth, K.A., and Sargent, J.D. (2008). Alcohol branded merchandise and its association with drinking attitudes and outcomes among US adolescents. *Archives of Pediatrics and Adolescent Medicine*. In Press.

Country
US

Baseline survey date
2003

Age group (years)
10-14

Study objective
Influence of ownership of alcohol branded merchandise (ABM) on initiation of alcohol use and binge drinking.

Alcohol marketing & media exposure
ABM (e.g. clothing, headwear, jewellery, key chains, shot glasses, posters, pens) ownership.

Drinking behaviour outcome measure
Initiation of alcohol drinking (unknown to parents); ever binge drinking (≥ 5 drinks in a row).

Sample/ Study Design
Random digit dial telephone survey of adolescents aged 10-14 years

Survey method
Telephone survey with computer-assisted telephone-interviewing procedure

Baseline sample size
4309 non-drinkers

Follow-up (months)
8 and 16

Follow-up rate
3762/4309 (87%) at 8 months
3317/4309 (77%) at 16 months

Analysis
Logistic regression to estimate hazards ratios (HR)

Covariates/ confounders analyzed
Age
Gender
Ethnicity
Susceptibility to alcohol use (response to peer offers, intentions and positive expectancies)
Exposure to movie alcohol use
Peer drinking
Parent drinking
Alcohol availability at home
Sensation seeking
Rebelliousness
Parenting (maternal responsiveness and maternal monitoring)
Extracurricular activities
School performance
TV viewing length of time
Parent report education
Household income

Outcome at follow-up
ABM ownership increased from 11% at baseline to 20% at 16 months. 10% of adolescents tried drinking for the first time and 5% tried binge drinking during each of the two 8 month periods. There was a reciprocal relationship between susceptibility and ABM ownership. Ownership of ABM at baseline did not have a significant direct impact on alcohol initiation at 8 months (HR=1.41, 95% CI 0.98-2.01), nor on alcohol initiation between 8 and 16 months (HR=1.57, 95% CI=0.99-2.5), but did on initiation of binge drinking at 8 months (HR=1.80, 95% CI=1.28-2.54), but not initiation of binge drinking between 8 and 16 months (HR= 1.44, 95% CI=0.90-2.31). New ownership of ABM at 8 months had a significant direct impact on alcohol initiation at 16 months (HR=2.31, 95%CI=1.6-3.35) and initiation of binge drinking at 16m (HR=2.22, 95%CI=1.49-3.32).

Article: Fisher, L., Williams, I., Austin, S., Camargo, C., & Colditz, G. **Predictors of Initiation of Alcohol Use Among US Adolescents.** *Archives of Pediatric and Adolescent Medicine* 161(10): 959 – 966, 2007.

Country	Baseline Survey Date
United States	1996, 1998

Age group (years)
At least 9 years of age in 1996 at onset of GUTS. Final sample included youth ages 11 – 18 in 1998

Study objective
To identify precursors of adolescent alcohol initiation and binge drinking

Sample
Members of Growing Up Today Study (GUTS); recruited from Nurses' Health Study II nurses who had children ages 9 – 14; initial baseline for GUTS was 1996. Total GUTS population is 16,882 girls and boys; Geographically distributed across U.S.; Baseline sample included youths completing GUTS follow-up surveys in 1998 and 1999, this group n=11834

Sample selection
Youth were included in this study if they completed an initial GUTS survey in 1996, and completed the annual GUTS surveys in 1998 and 1999; Youth having already initiated alcohol use by 1998 were excluded; Youth who did not respond to alcohol section questions in 1998 and 1999 were also excluded; Final sample for analysis included 5511 teens (2228 boys, 3283 girls)

Study design
Prospective cohort design. Compared self-reported alcohol initiation with individual/sociodemographic, family, and social context variables

Survey method
Self-report questionnaires. Items included on larger, annual health survey (by mail). Students leaving any relevant questions unanswered were excluded from analysis

Baseline sample size
11834 youth. 5027 boys, 6807 girls

Baseline measures
Tanner stage (pubertal stage); Race (measured only as white or non-white); Social self-esteem (scored on index); Athletic self-esteem (scored on index); Global self-esteem (scored on index); Scholastic self-esteem (scored on index); Cigarette smoking (within last year, "even a few puffs"); Family composition (number of parents present in home); Family dinner at home (range from never to always); Adults drink in home; Over-21 siblings who drink; Peer drinking; Have discussed alcohol advertising; Own or would use promotional/branded items; Alcohol expectancies (scored via adolescent version questionnaire);

Follow-up (months)
Alcohol initiation in 1999 was measured (12 month follow-up)

Follow-up rate
Final sample for analysis included 5511 youth. This out of 11834 kids completing all three relevant surveys (exclusions for lack of data – questions unanswered; alcohol initiation in 1998)

Analysis
All analyses were sex-stratified. Associations between all tested variables and alcohol initiation in 1999 were tested; significant variable in univariate analysis were included in multivariate logistic regressions; Where differences appeared between genders, interaction between that variable and sex was tested; Effect modification by age was analyzed with the cut-off at 15 years old (between "younger" and "older" groups). Effect modification by stage of alcohol uptake in 1998 was also examined (i.e., precontemplators, contemplators, experimenters, etc.); Logistic regressions yielded odds ratios for binge drinking among youth had initiated alcohol consumption in 1998.

Covariates / confounders analyzed
Self esteem (on various dimensions); Cigarette smoking (within last year, "even a few puffs"); Family composition (number of parents present in home); Family dinner at home (range from never to always); Adults drink in home; Over-21 siblings who drink; Peer drinking; Have discussed alcohol advertising; Own or would use promotional/branded items; Alcohol expectancies (scored via adolescent version questionnaire); Gender; Age;

Outcomes at follow-up
Associated positively with alcohol initiation in 1999; For boys and girls; Age; Tanner stage; Cigarette smoking; Adult drinking in the home; Sibling drinking; Peer drinking; Owning or willingness to use promotional or branded merchandise Girls_OR= 1.74 (1.37-2.19) Boys_OR= 1.78 (1.36-2.33) ; Higher alcohol expectancies index score; For boys only; Higher athletic self-esteem; For girls only; Higher social self-esteem; Living in a single-parent home; Eating dinner with family every night had a an inverse relationship with alcohol initiation for girls only;; No significant interactions were found for sex differences;; 5% of 1998 never-drinkers engaged in binge drinking in 1999;; Associated with binge drinking were age (boys), sibling drinking and owning branded merchandise (girls only: OR=1.79 (1.16-2.77)), and a higher alcohol expectancy index score (boys and girls);; Clearest and starkest finding is effect of dinner at home among girls (50% less likely to initiate alcohol use); Alcohol-branded promotional merchandise appears to have a greater effect on alcohol initiation than advertising.

Article: Pasch, K.E., Komro, K., Perry, C.L., Hearst, M.O., Farbaksh, K. . 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 and Drugs*, 68: 587-597, 2007.

Country

United States

Baseline Survey Date

Analysis of advertising content – 11 April – 16 May 2003. Students surveyed in fall 2002, spring 2003 (sixth grade). Spring data used for baseline as it coincided with advertising measurement

Age group (years)

Average age: 12.2 years at end of sixth grade

Study objective

To examine effects of exposure to advertising on young adolescent attitudes towards alcohol and alcohol use: To describe type, location, characteristics, and density of outdoor advertising around schools; To test hypothesis that exposure in 6th grade will lead to more positive norms and attitudes about alcohol use, increased alcohol behavior and intentions in 8th grade.

Sample

Youth participants: Sixth and eighth grade students from 63 Chicago city school sites (61 schools, two with split campuses); All students enrolled were eligible (n=4137) but analysis included only students for whom complete data were available at end of both 6th and 8th grade (n=2746); further constraints on data led to other exclusions, and final sample n=2586. Sample ethnically diverse (37% black, 33% Hispanic, 15% white, 7% Asian, 8% other or mixed race); Sample had even gender distribution

Advertisements: 1500-foot radius maps around each school site were created using GPS mapping software. Advertisements were photographed (for coding purposes) and located on a map with GPS software; All billboards and bus stops were documented; Other outdoor advertising was coded if alcohol-related;

Sample selection

Schools selected from a list of all public schools in Chicago: Schools that include grades 5 – 8; Schools with low mobility (<25%); Schools that were larger (at least 30 students per grade); Students were grouped into 22 neighborhood units; Units were randomly assigned to intervention condition (10 units) or control condition (12 units);

Study design

Part of Project Northland Chicago; Randomized controlled trial of alcohol prevention program; Students' alcohol behaviors and intentions measured at baseline and at two years' follow up; Prevalence of alcohol advertising, as proxy for alcohol exposure, measure at baseline

Survey method

Youth participants: Seven total scales. Survey contained items in five scales related to alcohol behavior and intentions, socio-environmental risk, norms and attitudes; Nine-item Alcohol Behavior and Intentions (with two subscales); three-item Normative scale; three-item Normative Expectations scale; six-item Outcome Expectancies scale; six-item Outcome Expectations scale;

Items measuring exposure to other (non-outdoor) alcohol advertising and awareness of outdoor alcohol advertising were included (two additional scales). Advertisements. All free-standing outdoor alcohol advertising examined, as well as all alcohol-related advertising on storefronts, bars, restaurants; Advertising coded for number of characteristics of models, language, presence of animals or humans, theme of ad; Quality control measures: Seven sites assigned to two data-collection teams; no significant differences detected in data collection; Two independent coders for content; Focus groups of youths in intervention schools validated coding of "youth-oriented" ads (vs. not youth-oriented)

Baseline sample size

2586 sixth-grade students

Baseline measures

Total of 931 alcohol advertisements within 1500-foot radii; 14.8 advertisements on average;; Range of numbers from 0 (n=22) to 109 advertisements (n=1);; Content measures;; Brand-name and information-only ads were most common for themes (56.1% and 20.4%, respectively); Culture represented in 16.2%; Sexual connotations in 2.5%; 60.7% of ads had no model at all; 41 youth-oriented ads (4.4% of ads) around 19 schools (range from n=0 to n=6); None advertised wine;

Follow-up (months)

Students were surveyed for baseline in sixth grade (data taken from a spring 2003 survey);

Students were surveyed in seventh grade (spring 2004, 12 months) and eighth grade (spring 2005, 24 months)

Data included in analysis only from baseline and from 24-month survey

Follow-up rate

All students enrolled in relevant grade level and schools were eligible for survey so students were not followed individually;

Baseline survey had 94% response rate;

24-month survey had a 96% response rate

Analysis

SAS software was used, through mixed regression models, to determine the association between number of advertisements around a school and student alcohol behaviours, intentions, norms, and attitudes.; Outcome variables measured against exposure; Behaviours and intentions; Behaviour only; Intentions only; Normative estimates; Normative expectations; Outcome expectations; Outcome expectancies;

Covariates / confounders analyzed

Sixth-grade level of outcome variables;
SES of the school site;
Exposure to other types of alcohol advertising;
Awareness of outdoor alcohol advertising

Outcomes at follow-up

Regression analysis demonstrated that among all students, exposure to outdoor alcohol advertising was statistically significantly associated with eighth grade behaviours and intentions, intentions-only, and outcome expectancies, after controlling for treatment, school SES, sixth-grade measures on outcome variables, and other covariates.
Exposure to advertising was not associated with behaviours, normative expectations, normative estimates, and outcome expectations.
Among students who have already initiated alcohol consumption, advertising had no impact on outcomes.
Results did not vary by gender, race or ethnicity.