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The effect of alcohol marketing on people with, or at risk of, an alcohol problem: A rapid literature review

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Contribution statement

RLM, TL, JLB and AB conceptualised the study. RLM and TL screened articles for inclusion, extracted data, synthesised results and drafted the report. JLB ran literature searches and synthesised results, AB ran initial literature searches and OB ran grey literature searches. All authors reviewed the results and approved the final version of the report.

Executive Summary

Background and aims

There is a comprehensive evidence base demonstrating the relationship between alcohol marketing and underage drinking. Far less is known about the impact of alcohol marketing on other potentially vulnerable populations, such as people with, or at risk of, an alcohol problem. For the purposes of this review, this includes people with an alcohol use disorder, in recovery from an alcohol use disorder, and hazardous and harmful drinkers.

This report presents findings from a rapid review that aimed to answer the following research questions:

- What is the effect of alcohol marketing on drinking behaviour in adults with, or at risk of, an alcohol problem?
- What are the psychological and neurological effects of alcohol marketing in adults with, or at risk of, an alcohol problem?

Methods

A rapid review of primary studies was conducted with the aim of exploring the effect or potential effect of alcohol marketing on people with, or at risk of an alcohol problem, as defined above. Studies were eligible for inclusion in this review if their populations were defined within the paper as being with, or at risk of an alcohol problem, taking into account the possibility of different definitions in different settings. Studies were only included if results or outcomes were presented separately for at least one of the populations of interest. Binge drinkers were not included as a population of interest in this review. Studies covering different aspects of the 'marketing mix' (the four Ps of promotion, place, product, and price) were included, with the exception of alcohol outlet density, labelling and non-branded alcohol cues. Children and adolescents were excluded from the review.

Quantitative and qualitative study designs were eligible for inclusion. Outcomes related to alcohol use were included, as well as psychological indicators such as awareness of or noticing marketing, appeal or perception of alcohol advertisements, alcohol craving, intentions to consume alcohol, symptoms of alcohol dependence and alcohol-related emotions and cognitions.

Searches for relevant literature were conducted through three peer-reviewed electronic literature databases (from inception to November 2021), reference list scanning and citation tracking of included studies, grey literature searching of relevant websites, and enquiries through expert networks. We undertook a narrative synthesis of included papers, grouping studies together by population (participants with harmful or hazardous consumption levels of alcohol and those recovering from an alcohol use disorder) and by type of study (quantitative; qualitative).

Overview of findings

The review included 11 studies, which focused on participants recovering from an alcohol use disorder (AUD, 6 studies) and those with hazardous or harmful consumption levels of alcohol (5 studies). Seven studies used a quantitative design and four used a qualitative design. Of the quantitative studies, three were cross-sectional studies and four were experimental studies.

A limited number of studies have investigated the effect of alcohol advertising in harmful/hazardous drinkers. In experimental studies, one included study found no effect of adverts on actual alcohol consumption, but found that alcohol advertising could influence positive alcohol-related emotions and cognitions among heavy drinkers. Another found that individuals who exhibit greater risky alcohol use are more likely to express intentions to consume alcohol upon exposure to beer than water ads. Finally, one study found shorter reaction times in problem drinkers relative to non-problem drinkers when exposed to non-branded alcohol images in a study where participants were instructed to respond as quickly as possible to 'go' stimuli whilst refraining from responding to 'no-go' stimuli with branded and unbranded alcohol pictures as stimuli.

Two cross-sectional studies highlighted the potential risks of alcohol advertising for heavy drinkers: one found that drinkers reporting symptoms of alcohol problems were more likely to notice alcohol brands in magazines and newspapers, while another found that among students, heavy drinkers perceived alcohol adverts as more appealing; however, due to the observational designs used, neither of these studies were able to make causal inferences about the effect of alcohol advertising.

Similarly, a small number of quantitative studies have investigated the effects of advertising on drinkers in recovery. Only two studies were found, both of which suggest a relatively small effect of alcohol advertising in this population. One cross-sectional study reported that more than three quarters of participants (77%) recalled seeing alcohol marketing in the last six months, with 24% reporting that alcohol marketing was influential. The most influential factors affecting the purchase of a specific alcohol product included price, accessibility, the brand and alcohol percent. Using an experimental design, a further study reported increased craving after exposure to alcohol advertisements and this measure showed a positive association with the number of alcohol-dependence symptoms. In absolute terms, however, craving was relatively low.

In three interview studies, respondents indicated that alcohol advertisements triggered a desire to drink, particularly those which contained the participants' preferred drink and even where the advertisements were perceived negatively. Some reported that they viewed advertisements as being responsible for their relapse. Television was cited as being a particularly powerful medium, with feelings that television intruded into their own home. One study further reported that music and party scenes were particularly troubling in terms of creating an association with good times. Participants in both studies reported negative emotions associated with viewing alcohol advertisements, including loss, lack of belonging, anger, sadness, guilt and exclusion from the norm. Participants in these studies reported needing to use strategies to avoid alcohol advertising, either through turning off and avoiding

advertises or recalling the negative aspects of alcohol use. The retail environment was also identified in one further qualitative study as being challenging for drinkers in recovery. High visibility of alcohol, especially in small shops where it is harder to avoid alcohol products, and in-store advertising were identified as risks to recovery.

Conclusions

- Taken together, the findings of the studies included in this review suggest that an effect of alcohol marketing in people with, or at risk of, an alcohol problem is likely.
- Several studies report effects of alcohol marketing such as influences on positive alcohol-related emotions and cognitions and alcohol craving, which may translate into effects on alcohol consumption. There is also evidence that alcohol marketing is perceived to act as a trigger by people in recovery from alcohol problems and pose a risk to recovery.
- This review demonstrates that the impact of alcohol marketing on people with or at risk of an alcohol problem should be a concern for marketing regulators and a focus for future research.
- Future research should include longitudinal and experimental studies to determine whether alcohol advertisement has a causal effect on alcohol use in people with or at risk of an alcohol problems, including the differential effects between these groups and of different types of marketing.

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1.0 Introduction

Harmful use of alcohol resulted in around 3 million deaths worldwide in 2016, accounting for 5.3% of all deaths and 5.1% of the global burden of disease expressed as disability adjusted life years.(1) In the UK in 2020, nearly 78% of alcohol-specific deaths were caused by alcohol-related liver disease and 12% by mental and behavioural disorders due to the use of alcohol (2), suggesting sustained high levels of alcohol consumption. Long term excessive use of alcohol has been linked to liver disease, heart disease, cancer, learning and memory problems, mental health and social problems (3), and alcohol misuse is estimated to cost the NHS and society as a whole £3.5 billion and £21 billion per year respectively.(4)

Alcohol use disorders (AUDs), as defined by the Diagnostic and Statistical Manual of Mental Disorders-5 (DSM-5) (5) are medical conditions characterised by an impaired ability to stop or control alcohol use despite adverse social, occupational or health consequences, and can be classed as mild, moderate or severe. They encompass conditions including alcohol abuse, alcohol dependence, and alcohol addiction. AUDs are the leading risk factor for premature mortality and disability among 15-49 year olds with over 100 million estimated cases worldwide in 2016.(6)

AUDs are complex, chronic disorders that arise from a complex interaction between individual, social, cultural and biological factors.(7) Alcohol itself also contributes to the development and persistence of AUDs through a variety of mechanisms including availability (availability in shops, to minors, prices of alcoholic products), the position of alcohol in society, and alcohol advertising and sponsorship.(8) Alcohol related factors are potentially modifiable, and initiatives have been put in place to reduce harmful alcohol use. One such example is the World Health Organization SAFER initiative, which recommends the following: **S**trengthen restrictions on alcohol availability; **A**dvance and enforce drinking counter-measures; **F**acilitate access to screening, brief interventions and treatment; **E**nforce bans or comprehensive restrictions on alcohol advertising, sponsorship and promotion and **R**aise prices on alcohol through excise tax and pricing policies.(9)

Alcohol availability, prices, advertising, products and brands can be included in a larger concept of alcohol marketing known as the 4Ps: Product, Place, Price and Promotion.(8) Alcohol marketing takes place through a wide variety of venues and formats including traditional print and broadcast, digital media, outdoor advertising, product placements within TV shows, films and song lyrics, in-store and price promotions, branded merchandise, celebrity endorsements and sporting and musical event sponsorships.(10)

Studies focussing on the advertising or wider marketing of alcohol have often reported on its impact on young people or adolescents, a population often viewed as vulnerable in terms of susceptibility to marketing. Two systematic reviews have appraised relevant literature in these populations and concluded that alcohol marketing was associated with increased drinking intentions, increased overall alcohol consumption and earlier alcohol initiation (10, 11) and increased binge or hazardous drinking.(10) Sargent and Babor (12) undertook a descriptive synthesis of

11 narrative and systematic reviews focussed on the relationship between exposure to alcohol marketing and youth drinking. Evidence of causality for all nine of the Bradford Hill criteria were reported as conclusions across included articles, and as main conclusions regarding strength of association (10, 13-22), consistency (10, 16, 20, 21), temporality (10, 17-21), biological plausibility,(13, 14, 16, 17) experimental evidence (21) and analogy.(22) Further, specificity of association, biological gradient and coherence were reported as secondary conclusions in multiple studies and thus the authors concluded that, based on the available literature, the association between alcohol marketing and drinking among young persons is causal.

Less attention has been paid to the effect of alcohol marketing on adults; however, adults may also be susceptible to alcohol marketing, particularly those with already high levels of consumption. Heavy alcohol users are known to react strongly to generic alcohol cues (23) and may be easily distracted by alcohol-related stimuli.(24) Increased alcohol consumption has been positively associated with increased attentional biases towards alcohol cues (25) and these attentional biases may increase subjective alcohol cravings,(26) thus a theoretical positive feedback loop may exist among heavy alcohol users; alcohol related stimuli become more salient as cravings increase, and cravings increase as greater attention is paid to alcohol-related stimuli.(25) Increased vulnerability may also be defined by a variety of personal attributes and individual difference factors such as a family history of alcohol dependence, certain personality characteristics and disorders as well as psychiatric syndromes such as alcohol dependence which may make former drinkers more likely to experience alcohol craving in response to alcohol marketing. Alcohol-dependent individuals may also be particularly vulnerable because of the disproportionate harm they experience from alcohol and an increased susceptibility to alcohol marketing.(27)

Current self-regulated alcohol marketing codes do not include a definition of vulnerability, nor do they explicitly reference heavy alcohol users as a potentially vulnerable group. It may be argued that the alcohol industry is currently exploiting this gap to target heavy drinkers through its advertising. Hessari et al. reviewed case studies published by the advertising industry which evaluated the effects of alcohol advertising campaigns and reported that alcohol industry claims that advertising does not promote or condone irresponsible or harmful drinking is false. There is evidence from some case studies that advertising intends to target heavy drinkers or promote or condone heavy or irresponsible drinking. These case studies included brands such as Miller Lite, Campari, John Smith's Bitter, Stella Artois, Famous Grouse whisky, Scottish Leader whisky.(28)

This rapid review brings together evidence on the effect of alcohol marketing in people with, or at risk of, an alcohol problem. For the purposes of this review, this includes people with an alcohol use disorder, in recovery from an alcohol use disorder, and hazardous and harmful drinkers.

This review seeks to answer the following research questions:

- What is the effect of alcohol marketing on drinking behaviour in adults with, or at risk of, an alcohol problem?

- What are the psychological and neurological effects of alcohol marketing in adults with, or at risk of, an alcohol problem?

2.0 Methods

A rapid review of primary studies was conducted with the aim of exploring the effect or potential effect of alcohol marketing among people with, or at risk of, an alcohol problem. Rapid reviews have been defined as ‘a form of knowledge synthesis in which components of the systematic review process are simplified or omitted to produce information in a timely manner.’(29, 30) In line with this, a literature search was undertaken to identify evidence meeting the following inclusion criteria, which was based on using the Population-Exposure-Outcome framework.

Inclusion criteria for considering studies

Population

We included studies of the following populations of interest:

- Those with alcohol use disorders
- Those in recovery from an alcohol use disorder
- Hazardous and harmful drinkers.

Studies were eligible for inclusion in this review if their populations were defined within the paper as being with or at risk of an alcohol problem, taking into account the possibility of different definitions in different settings, and including the use of screening tools such as the Alcohol Use Disorders Identification Test (AUDIT), the Alcohol Use Disorders Identification Test for Primary Care (AUDIT PC), the Alcohol Use Disorders Identification Test for Consumption (AUDIT C), the Fast Alcohol use Screening Test (FAST), the Single Alcohol Screening Questionnaire (M SASQ) (31) and the Rapid Alcohol Problems Screen (RAPS4).(32) Further, studies were only included if results or outcomes were presented separately for at least one of the populations of interest, i.e. if a study population included hazardous drinkers but did not present findings for these separately, the study was excluded. Where participants were not explicitly defined as having or being at risk of an alcohol problem, studies were included if the population met the National Institute for Health and Care Excellence (NICE) definition for alcohol dependence, or harmful (between 14 and 35 units per week for women/14 and 50 units per week for men) or hazardous drinking (above 35 units per week for women and over 50 units per week for men).(33)

Binge drinking is defined by NICE as a heavy drinking session in which someone drinks a lot of alcohol in a short period of time, raising their risk of harm on that occasion; including risk of injury, losing control or misjudging risky situations.(33) Whilst binge drinking can be problematic, for the purposes of this review it was

deemed to be different from harmful or hazardous drinking and therefore binge drinkers were excluded from our populations of interest if they did not also fall into the inclusion criteria described above.

Exposure of interest

'Alcohol marketing' covers a wide range of activities and disciplines. We included studies covering different aspects of the 'marketing mix' (the four Ps of promotion, place, product, and price), using the following as a guide:

- Promotion – full range of promotional tools, including marketing on traditional and digital media, outdoor and public space advertising (e.g. billboards, on public transport), and via sponsorship, celebrity/influencer endorsement, non-price promotions such as competitions and merchandise.
- Place – alcohol advertising and placement of alcohol within the off-trade retail environment (e.g. end-of-aisles, behind tills, etc.); adverts/promotions when shopping online (e.g. basket prompts, 'other people have bought' etc.).
- Product – packaging as a promotional tool.
- Price – price discounting as a form of price promotions. Minimum Unit Pricing and taxation were both out of scope.

Alcohol cues were included if the study clearly described the use of specific branded alcohol products. Non-specific alcohol cues, such as glass of wine or pint of lager, were excluded. Alcohol outlet density and product labelling were out of scope and thus excluded.

Outcomes

Whilst the main outcome of interest was alcohol consumption, we used broad inclusion criteria on outcomes so as to capture any studies which could provide an insight into the possible direct or indirect effects of alcohol marketing on alcohol use. Any outcomes related to actual alcohol consumption were therefore eligible, as well as indicators such as awareness of or noticing marketing, appeal or perception of alcohol advertisements, alcohol craving, intentions to consume alcohol, symptoms of alcohol dependence, and alcohol-related emotions and cognitions; all of which could contribute to subsequent alcohol consumption. Neurological outcomes related to cognition assessed using functional MRI scans were also eligible for inclusion.

Study designs

Both quantitative and qualitative studies were eligible for inclusion. All comparative quantitative study designs were eligible, including cross-sectional studies, longitudinal studies and experimental studies, including randomised controlled trials.

Search strategy

A comprehensive search of peer-reviewed and unpublished literature was conducted in November 2021. Published, peer-reviewed literature was identified from searching three electronic database: Medline (OVID), EMBASE (OVID) and PsychINFO

(OVID). The search strategy was developed based on subject heading and keyword/free text terms for the population, intervention/exposure/phenomena of interest, and study designs (Appendix 1).

Grey literature was identified from searching the following relevant websites: World Health Organization (<https://www.who.int/>); Scottish Health Action on Alcohol Problems (<https://www.shaap.org.uk/>); Alcohol Change UK (<https://alcoholchange.org.uk/>); Department of Health and Social Care (<https://www.gov.uk/government/organisations/department-of-health-and-social-care>); Public Health England (<https://www.gov.uk/government/organisations/public-health-england>), National Institute of Health and Care Excellence (<https://www.nice.org.uk/>); and Alcohol Focus Scotland (<https://www.alcohol-focus-scotland.org.uk/>).

To identify further potentially eligible studies, forward and backwards searching of included studies was performed and experts from within the alcohol marketing expert network facilitated by Alcohol Focus Scotland were contacted. Reference lists of included studies were also screened.

Study screening and selection

All hits identified by the searches were uploaded into Rayyan (<https://www.rayyan.ai/>) for de-duplication before screening and selection commenced. A two stage approach was taken where first all titles and abstracts were screened by two reviewers (AB and RM, or RM and TL). The full texts of studies identified as potentially relevant by their title and abstract were sought and screened independently by two reviewers (RM and TL) against the inclusion criteria. Disagreements were resolved by discussion or using a third reviewer (JLB).

Data extraction and synthesis of findings

Data extraction of the studies included in the review was undertaken by one reviewer (RM) and checked by a second reviewer (TL). Information on author, country, year of publication, population and their characteristics, definitions of drinking behaviour/dependence, study design, numerical and qualitative findings, and conclusions relevant to the aim of the review were extracted. Because the review was intended to provide a broad overview of the available evidence within a relatively short timescale, no assessment of quality of the included papers was undertaken.

Due to the diverse nature of the included studies we were unable to conduct a meta-analysis or meta-synthesis, and therefore a narrative synthesis approach was used, where studies were grouped together according to their population (participants with hazardous or harmful consumption levels of alcohol and those recovering from an alcohol use disorder) and by type of study (quantitative [experimental, comparative observational]; qualitative).

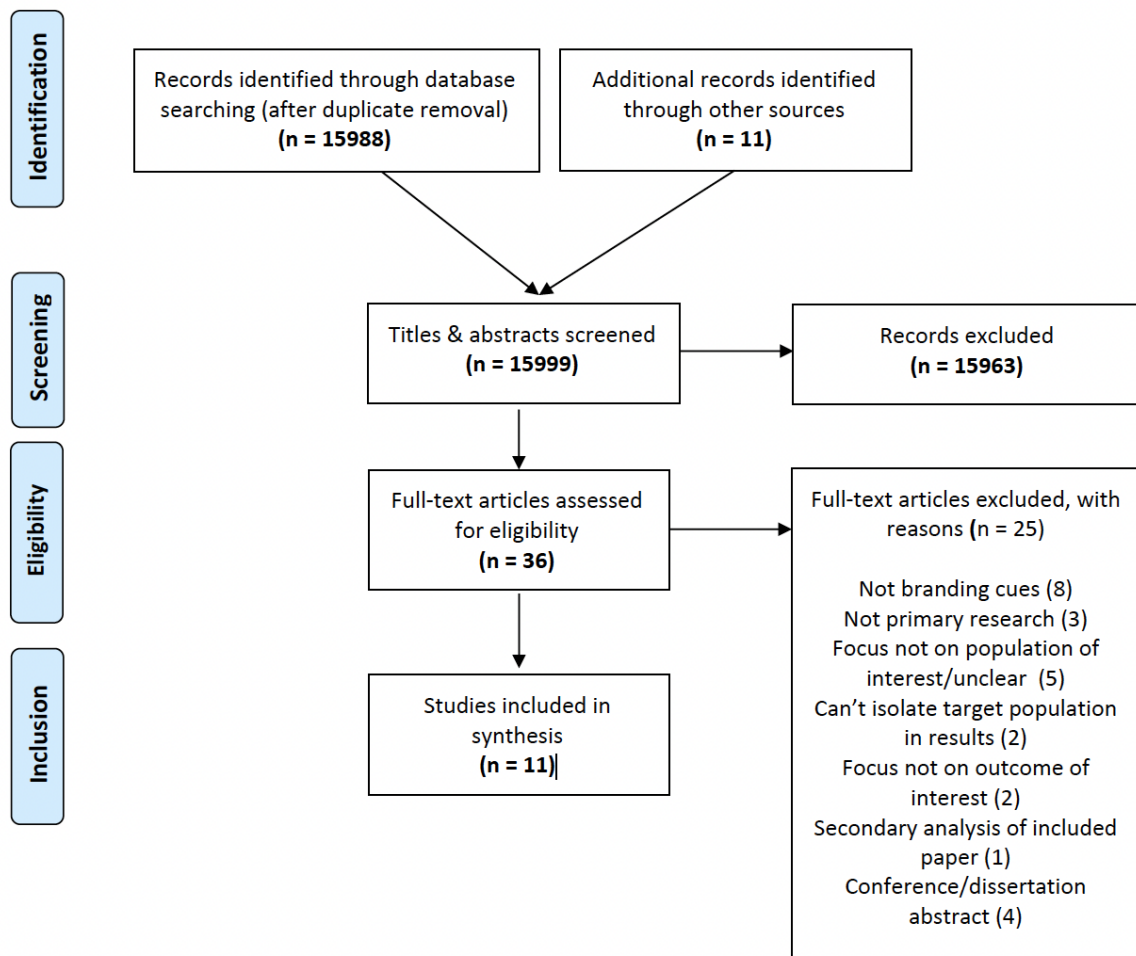


Figure 1: PRISMA diagram for searches

3.0 Findings

The literature searches identified 15,999 hits, of which 11 were identified from non-electronic database searching. Following screening the titles and abstracts of 15,999 hits, the full text articles were sought for 36 potentially identifiable studies. Following screening the full texts, 11 studies were finally included in the review (8, 23, 34-42). Twenty-five studies were excluded from the review at the full text stage due to either the intervention/exposure/phenomena of interest not focusing on branded cues (eight studies), having an ineligible or unclear population (four studies), the eligible population not being presented separately (two studies), ineligible outcome measures (two studies), the study not being primary research (three studies) or solely presented as a conference or dissertation abstract (four studies), or as a secondary analysis of an included study (one study).

The summary table of the 11 included studies can be found in Appendix 2.

The 11 included studies focused on participants with hazardous or harmful consumption levels of alcohol (five studies) or those in recovery from an alcohol use disorder (AUD, six studies). Seven studies used a quantitative design and four used a qualitative design. Of the seven quantitative studies, three were cross-sectional studies and four were experimental studies. Of the qualitative studies, three used interviews and the fourth study used a participatory research method including focus groups.

The study sample sizes ranged between 91 and 510 for the cross-sectional studies; between 71 and 204 in the experimental studies; and between nine and 23 in the qualitative studies.

Most of the studies were undertaken in Europe: two in France, one in each of Scotland, the Netherlands, Belgium and the UK. Three studies were undertaken in the US and one study in each of South Africa and New Zealand. Year of publication ranged from 1997 to 2021. Only one study was undertaken prior to 2000, three were published since 2020 with the remaining eight studies published between 2008 and 2019.

The results from the included studies are presented separately for the two populations of interest: 1) adults with hazardous and harmful levels of drinking, and 2) drinkers in recovery from an alcohol use disorder.

3.1 Hazardous/harmful drinkers

Five studies were identified which investigated the effect of alcohol advertising in hazardous/harmful drinkers, which included three experimental studies (36) (34) (35) and two comparative observational studies (23, 37), using a cross-sectional design. No qualitative studies exploring the phenomena of interest were included in the review.

Experimental studies

Stautz et al. (34) undertook an experimental study in 194 adults aged 18-25 years with an AUDIT-C score of 5 or higher (equivalent to 8 or higher in AUDIT) to estimate the immediate impact of viewing alcohol advertisements on observed alcohol consumption in young adult heavy drinkers. Participants were randomised to viewing one of three sets of video advertisements that included either (i) alcohol-promoting, (ii) alcohol-warning, or (iii) non-alcohol advertisements and the primary outcome was the proportion of alcoholic beverages consumed in a sham taste test. The study found that alcohol consumption did not differ between participants exposed to the different types of advertisements. The study did find that participants in the alcohol-promoting advertisement group showed increased positive affect and an increased approach/reduced avoidance bias towards alcohol compared with those exposed to non-alcohol advertisements, suggesting an influence of alcohol-promoting adverts on positive alcohol-related emotions and cognition.(34)

Alhabash et al. (35) undertook an experimental study in 121 adults aged 21-64 years with an average AUDIT score of 6.56 (range 0-24) to explore how AUDIT score moderates the effect of beverage type advertisement, and the interaction between

beverage type and brand familiarity on intention to consume alcohol and preference for a bar or coffee shop gift card. Participants were randomly assigned to one of four conditions: familiar or unfamiliar beer and familiar or unfamiliar water. In each condition, participants were exposed to three advertisements on Facebook, each followed by questions related to attitudes toward the advertisement, attitudes toward the brand, behavioural intentions, and intentions to consume alcohol. The advertisements were identical across the four conditions, with the exception of the brands being either familiar or unfamiliar for beer and water. Participants were offered a gift card which they could select to use either at a local bar or a coffee shop as part of the experiment, and also served as a reward for participation. Overall, intention to consume alcohol was not affected by AUDIT score, however increasing levels of AUDIT score were associated with a greater intention to consume alcohol in the sub-group of participants exposed to beer advertisements rather than those exposed to water advertisements. Brand familiarity increased intention to consume alcohol upon exposure to beer advertisements for those with moderate AUDIT scores, and greatest increased intention was seen in those with high AUDIT scores. Participants exposed to beer advertisements were more likely to select the bar gift card but there was no moderating effect of AUDIT score.(35)

In contrast, in the third experimental study, Kreuzsch et al. (36) tested response inhibition toward alcohol-related cues in problem and non-problem drinkers using a modified alcohol go/no-go task. In a go/no-go task, participants are typically informed to respond to one set of stimuli and refrain from responding to another. For the purposes of this study, participants were presented with pictures of either alcoholic drinks or neutral office equipment items (both including or excluding visible brand logos). Before the start of each block, participants were informed to which type of stimuli to respond (i.e. which were the go stimuli) and informed that when a go stimulus was presented they should press the space bar of a keyboard as fast and accurately as possible, and they should not respond to the no-go stimulus. Participants were successively shown one of two picture combinations: 1. alcoholic drink pictures as go stimuli vs. neutral object pictures as no-go stimuli or 2. neutral object pictures as go stimuli vs. alcoholic drink pictures as no-go stimuli (including pictures with and without brand logos). The authors' stated hypothesis was that problem drinkers would show a stronger cognitive bias in the processing of alcohol cues, as evidenced by shorter reaction times and/or higher rates of incorrectly responding to the no-go stimuli. The study did not explicitly assess the effects of marketing/advertising, but investigated differences in response to branded and unbranded stimuli. The study recruited undergraduate students, who were classified as problem or non-problem drinkers based on AUDIT scores. A cut-off score of 11 was set for the recruitment of problem drinkers and a cut-off score of maximum 7 for non-problem (i.e. low-risk) drinkers. The study found shorter reaction times in problem drinkers relative to non-problem drinkers but only in the experimental condition with no brand logos on the alcohol pictures. Brand alcohol logos did not further decrease reaction times in problem drinkers, but significantly reduced reaction times in non-problem drinkers.(36)

Comparative observational studies

Two cross-sectional studies were included in the review which highlighted the potential risks of alcohol advertising for hazardous/harmful drinkers.(23, 37)

In the first study, Petersen-Williams et al. (37) undertook a cross-sectional study of adult drinkers in South Africa using data from the International Alcohol Control Study, conducted in 2014, with the aim of identifying the extent of heavy drinking and symptoms of alcohol problems (based on the Rapid Alcohol Problems Screen, RAPS4 (32)) and associated demographic and other risk factors, including alcohol advertising. A higher proportion of participants who reported symptoms of alcohol problems noticed alcohol brands on large posters and billboards (84%) than those without symptoms (73%). They were also more likely to notice brands on signs or posters, special price offers on TV, free offers when buying alcohol and in magazines or newspapers. In addition to the above, heavy drinkers also noticed brands being advertised on the radio, on clothing and through sponsorship of sporting and music events as compared to their non-heavy drinking counterparts. In logistic regression analysis, those who noticed brands advertised in magazines and newspapers had nearly three times significantly higher odds of reporting symptoms of alcohol problems (OR 2.82, 95% CI 1.24-6.40). However, the association was not statistically significant for noticing brands elsewhere, such as on billboards or in sports sponsorship.(37)

In the second study, Noel et al. (23) undertook a secondary analysis of cross-sectional data to determine if alcohol use influences perceptions of alcohol advertisements broadcast in the US. Three hundred and twenty-six students completed questions about demographic characteristics, individual alcohol use history, and parental alcohol use history before viewing five alcohol advertisements – four television advertisements and one print advertisement. After each advertisement, participants answered 48 questions based on the 1997 Beer Institute's Marketing and Advertising code, including questions about advertisement appeal, perceived alcohol consumption in the advertisement, perceptions of responsible drinking in the advertisement and how many drinks the participant perceived the main character to consume in the situation shown in the advertisement. Heavy alcohol users were defined as those with an AUDIT score of 8 or higher. This group perceived alcohol advertisements as more appealing, reported higher levels of perceived alcohol consumption in the advertisements and perceived high levels of consumption as 'responsible drinking'.(23)

3.2 Drinkers in recovery from an alcohol use disorder

Six studies were identified which investigated the effect of alcohol advertising in drinkers in recovery from an alcohol use disorder, which included one experimental study (38), one comparative observational study (8), using a cross-sectional design, and four qualitative studies.(39-42)

Experimental studies

One study was identified that experimentally investigated the effects of advertising on drinkers in recovery, which suggested a relatively small effect of alcohol advertising in this population. Witteman et al. (38) undertook an experimental study of 79 adults in alcohol detoxification treatment to assess the nature of physiological cue reactivity and craving in response to alcohol cues, specifically alcohol advertisements, among alcohol-dependent patients. Participants reported being

exposed to an average of five advertisements per day for alcohol and four for soft drinks. Alcohol cravings after soft drink and alcohol advertisement exposure were measured using a 100-mm Visual Analogue Scale and showed significantly higher craving levels after exposure to an alcohol advertisement (median =14) as compared to the level of craving after a soft drink advertisement (median=5) ($p<0.001$). Absolute craving after alcohol-advertisement exposure showed a positive association with the number of alcohol-dependence symptoms (38), indicating that higher levels of craving were associated with more severe alcohol dependence. In absolute terms, however, craving was relatively low.

Comparative observational studies

One identified study, which assessed the observational association of advertising on drinkers in recovery, suggested a relatively small effect of alcohol advertising in this population. Guillou Landreat et al.'s cross-sectional study (8) was conducted in France and interviewed 91 adults who were seeking treatment for an alcohol use disorder, and aimed to explore how they reacted to alcohol marketing. More than three quarters of participants (77%) recalled seeing alcohol marketing in the last six months. The majority (72%) reported they were not influenced by alcohol marketing, with 24% reporting that alcohol marketing was influential. When asked to explain their main criteria for buying a specific type of alcohol, however, participants cited the following marketing elements, suggesting that the proportion influenced by marketing is higher: price (39.5%, $n = 36$), accessibility (25.2%, $n = 23$), the brand (24.2%, $n = 22$) and alcohol percent (18.6%, $n = 17$). (8)

Qualitative studies

Three qualitative studies (39-41) included in the review used interviews to explore the effect of alcohol advertisements on drinking. One further qualitative study aimed to explore the role that the environment plays in recovery among individuals recovering from alcohol dependence. (42)

In the first study, Thomson et al. (39) undertook interviews with 21 adult participants in treatment for or in recovery from harmful alcohol use (time in recovery ranged from 1.5 months to 17.5 years). The second study, Guillou Landreat et al. (40), undertook 23 semi-structured interviews with participants aged between 24 and 60 with alcohol use disorder attending an addiction service. In the third study, Treise et al. undertook interviews with 20 participants recovering from an alcohol use disorder (time in recovery ranged from 3 weeks to 20 years).

In all three studies, respondents indicated that alcohol advertisements triggered a desire to drink or acted as an incentive to drink. (39-41) The advertisements were reported as being appealing, with findings particularly apparent in those which contained the participants' preferred drink. (39) Additionally, some participants reported that they viewed advertisements as being responsible for their relapse. (39) In one study, some respondents reported that alcohol advertisements acted as an incentive to drink, even where the advertisements were perceived negatively. (40) One study also reported that alcohol advertisements which included music and party scenes were particularly troubling in terms of creating an association with good times. (41) Television was cited as being a particularly powerful medium for alcohol advertisements, (39, 41) with feelings that television intruded into their own

home.(39) Participants reported negative emotions associated with viewing alcohol advertisements, even those reported as being appealing, including loss, lack of belonging, anger, sadness, guilt and exclusion from the norm, and reported needing to use strategies to avoid alcohol advertising, either through turning off and avoiding adverts (39, 41) or recalling the negative aspects of alcohol use.(41) New advertisements were suggested as being more problematic, as respondents were not always aware it was an alcohol advertisement and thus may have been unable to employ tested protective mechanisms (39), with some qualitative evidence presented to suggest that the effect of advertising may become less problematic for some people with increased time in recovery.(39, 41)

In the fourth qualitative study, Shortt et al. (42) explored the impact of the environment for drinkers in recovery. The study, which recruited participants recovering from an alcohol use disorder, identified retail-based environments as the biggest single challenge to recovery. In particular, the study reported that the key factors included the visibility of alcohol in shops, particularly in smaller shops, where it was perceived as harder to avoid aisles containing alcohol; and in-store marketing and price promotions.(42)

4.0 Discussion

Summary of findings

Our review identified a limited number of studies assessing the effect of alcohol marketing in people with, or at risk of, an alcohol problem. The effect of alcohol advertising on alcohol use was only assessed in one small experimental study of young adult heavy drinkers, which found no apparent effect. Studies looking at other outcomes suggested that a significant proportion of people with or at risk of alcohol problems notice alcohol advertisements and can find them appealing, and that advertisements may have an effect on positive alcohol-related emotions and cognitions. Among people in recovery from an alcohol use disorder, the findings suggested that there could be an effect on craving, and that alcohol marketing may be perceived to trigger a desire to drink. Overall, the findings from the included studies point to a likely effect of alcohol marketing in these populations, although the evidence is currently very limited and comes from a highly heterogeneous group of studies.

Hazardous/harmful drinkers

Several of the included studies suggested an effect of alcohol marketing in people with alcohol use disorders and hazardous and harmful drinkers, which could have the potential to translate to an effect on alcohol use. For example, Petersen-Williams et al. (37) reported that a significant proportion of participants reporting symptoms of alcohol problems said that they noticed alcohol marketing in a variety of settings. The authors discuss that the results in this study may be due to heavy or problem drinkers being more likely to be exposed to alcohol marketing, and in turn more likely to notice them as they are more interested. The authors state that their findings provide support for further investigation into potential advertising bans, and conclude that these findings support restrictions on alcohol advertising. Given the cross-

sectional nature of the study, however, it is not possible to draw firm conclusions from the study results. In a further study, US students with a history of heavy alcohol use were found to perceive alcohol advertisements as more appealing than people without a history of excessive alcohol use, (23) and the authors conclude that the study findings suggest that heavy drinkers may be a vulnerable group that should be protected from alcohol advertising.

In the paper by Stautz et al., the authors concluded that there may be an influence of alcohol-promoting adverts on positive alcohol-related emotions and cognition (34) that may subsequently increase alcohol consumption, and thus restricting alcohol-promoting advertising could remove a potential influence on positive alcohol-related cognitions and emotions among heavy drinking young adults. In the paper by Alhabash et al., the authors concluded that individuals who exhibit greater risky alcohol use are more likely to express intentions to consume alcohol upon exposure to beer than water advertisements on Facebook.(35) Findings suggest that alcohol advertisements encourage individuals to drink and engage in risky behaviours, and the authors suggest that, particularly given the easy access to social media, this provides policymakers with evidence to call for stricter regulation of social media and social networking sites in relation to the availability of alcohol cues and content.

Kreusch et al. (36) found that both problem drinkers and non-problem drinkers showed a cognitive bias toward alcohol cues, as evidenced by significantly shorter mean reaction times following exposure to alcohol pictures; however, problem drinkers only showed stronger cognitive bias for non-branded alcohol pictures. The addition of branded alcohol logos did not further reduce reaction times in heavy drinkers. The authors suggest that a possible explanation for this is that the alcohol bias had already reached a floor effect in problem drinkers without brand logos. The authors conclude that the difference between response in problem and non-problem drinkers was small, but highlight the fact that the population consisted of young students with a relatively short history of alcohol consumption, and hypothesise that a population of drinkers with a longer alcohol consumption history may show stronger cognitive biases towards alcohol cues in a similar experiment.

Only one experimental study did not provide evidence of a potential impact of alcohol marketing on hazardous drinkers. Stautz et al. (34) found that alcohol consumption in problem drinkers did not differ between participants exposed to alcohol warning or alcohol promoting advertisements, though alcohol promoting advertisements did have a suggested influence on positive alcohol-related emotions and cognitions. The authors highlight that the laboratory setting of the experiment and high proportion of alcohol advertisements is likely not reflective of a real world environment and conclude that restricting alcohol-promoting advertising could remove a potential influence on positive alcohol-related emotions and cognitions among heavy drinkers.

People in recovery from an alcohol use disorder

The review identified only one experimental study investigating the effect of alcohol marketing on people in recovery from an alcohol use disorder; Witteman et al. found that participants showed higher craving levels after exposure to an alcohol advertisement compared with exposure to a soft drink advertisement, although the effect was small.(38) The authors suggest that their results could imply that reducing alcohol cues in advertisements could, theoretically, reduce the occurrence of episodes of acute craving and cue reactivity in alcohol-dependent patients. The authors do, however, note that their results should be taken as preliminary due to a number of limitations within the study.

Findings from three qualitative studies indicated that people in recovery perceive alcohol advertisements to be problematic and could act as triggers to desire a drink or as an incentive to drink.(39-41) Guillou Landreat et al. reported the majority of respondents claimed to often see alcohol marketing messages, and felt that this marketing encourages drinking.(8) The authors suggest that the findings highlight the importance of reconsidering the issue of alcohol marketing in France, at a time where legislation is weakened, to help limit exposure to alcohol stimuli among vulnerable populations.

Similarly, Thomson et al. summarised that nearly all of those interviewed felt that alcohol advertising on television in New Zealand had made it difficult to abstain from drinking at some stage of their sobriety, with some holding this as specifically responsible for their relapse. The authors state that their findings are consistent with research suggesting that those with a history of alcohol-related problems are responsive to environmental alcohol stimuli (39). Treise et al. reported similar findings, with interviewees reporting that advertising serves as one of a number of environmental factors that can trigger an impulse to drink, with television and outdoor advertising identified as hindering recovery. Imagery such as party scenes and music were reported as being particularly problematic. The authors summarise that their study findings indicate that for at least some individuals with an alcohol use disorder, described in this study as alcoholics, alcoholic beverage advertising impedes the recovery process in this vulnerable group. They also state that whilst they make no attempt to generalise their findings outside of the study population, it would be reasonable to assume that their responses to and interpretations of alcohol advertising may be similar amongst others treated for an alcohol use disorder.(41)

In line with the above, the findings from a small cross-sectional study also suggested that a significant proportion (approximately one in four) of those with an alcohol use disorder perceived that they are influenced by alcohol marketing.(8) The authors conclude that the study highlights the need to revisit alcohol marketing regulations in France, although they do also acknowledge that this is a preliminary study and findings should be confirmed in a larger study.

The results presented in this review are consistent with those from a report published by the Alcohol Health Alliance, which was published after the end date of our literature searches, which presents qualitative data reflecting that those in recovery from alcohol dependence report that alcohol marketing can act as a trigger for relapse and makes it difficult for them to abstain from alcohol consumption.(43) The

report also states that the persistent marketing of alcohol in the environment is one of the largest risks in recovery from alcohol dependence, a finding also highlighted in a number of papers included in this review.

While it is not possible to draw conclusions about the causal effect of alcohol marketing on alcohol consumption in this population due to the findings being based on cross-sectional or qualitative data, they suggest that exposure to alcohol marketing may make it more difficult for people in recovery to stay sober and that it may contribute to relapse. Indeed, a number of studies have offered direct reports from those affected by alcohol use disorders on a daily basis detailing how they perceive alcohol advertising to negatively affect their perceptions and behaviour, and directly threaten their sobriety. However, more robust study designs, including those using longitudinal or experimental designs are required to confirm this. From the studies included in this review, there is also some indication that certain types of marketing might be perceived to be particularly problematic, for example those that are broadcasted via television and in-store advertising, and alcohol advertising that feature music or party scenes.(39, 41, 42)

Review findings in the context of wider literature

The review findings, which indicate a possible effect of alcohol marketing in people with, or at risk of, alcohol problems, are in line with existing literature, which indicates that heavy drinkers react strongly to generic alcohol cues.(23) For example, binge drinkers have been shown to be more reactive to alcohol cues and less reactive to non-alcohol cues, and non-dependent binge drinkers have been demonstrated to show greater reactivity to alcohol cues than light drinkers.(44) Heavy alcohol users may also be easily distracted by alcohol-related stimuli.(24) In other existing research, increased activation of neural pathways associated with visual attention, memory, motivation, and habit has been observed in heavy drinkers after exposure to alcohol cues, which the authors suggest may indicate vulnerability for heavier future drinking.(45)

These existing findings, together with the findings of our review suggest that people with or at risk of alcohol problems may be vulnerable to alcohol marketing. This is in line with a paper by Babor et al. (2016), who critically evaluated the concept of vulnerability in terms of susceptibility to alcohol-related harm and susceptibility to the effects of marketing among specific populations and considered the implications of vulnerability for the regulation of alcohol marketing.(27) They concluded that individuals with a history of alcohol dependence (along with those of younger age and incomplete neurocognitive development) may be particularly vulnerable to alcohol marketing due to the disproportionate harm they experience from alcohol and their increased susceptibility to alcohol marketing. In particular, Babor et al. highlight evidence that heavy drinkers respond differently to alcohol cues than light or social drinkers on measures of psychophysiology, attentional bias, cognitive processing, urges to drink and positive affect. More specifically, increased alcohol consumption has been positively associated with increased attentional biases towards alcohol cues (25) and these attentional biases may increase subjective alcohol cravings (26), thus a theoretical positive feedback loop may exist among heavy alcohol users; alcohol related stimuli become more salient as cravings increase, and cravings increase as greater attention is paid to alcohol-related stimuli.(25)

Babor et al. provide an overview of the evidence in relation to the effect of alcohol cues in heavy drinkers which support the findings of the current review. They report that a meta-analysis of functional neuroimaging studies has identified greater neural activation after exposure to alcohol-related stimuli in heavy alcohol users in the ventral striatum (involved with reward, and the transition between reward and habit) and ventral anterior cingulate cortex (involved with reward, emotion and motivation) areas of the brain.(46) Activity in the ventral striatum has been positively correlated with severity of dependence, amount of drinking, impaired control and magnitude of craving. They also highlight the important finding that cue-reactivity has been shown to be predictive of alcohol consumption and relapse after treatment in people with an alcohol use disorder, described as alcoholics in this study.(47) Further, participants in an alcohol treatment program who exhibited increased cue-elicited alcohol craving were more likely to relapse.(48) Furthermore 8–10% of the variance in alcohol consumption among those with an alcohol use disorder undergoing in-patient treatment after discharge was explained by the desire to drink after cue-reactivity sessions.(49)

Strengths and limitations

A rapid review methodology was adopted for this review; therefore there is the potential for the findings of the review to be more susceptible to bias than a full systematic review. However, a significant part of the review methods were conducted in accordance with standard systematic review methodology, including conducting a comprehensive search of multiple databases, grey literature searching, and dual screening of search results. Additionally, we did not impose any language restrictions and therefore have minimised the potential for non-English language studies to have been missed; however, only one eligible non-English language study was identified to meet the inclusion criteria and included in the review. For our inclusion criteria, we used broad definitions for the populations of interest and outcomes, and included both qualitative and quantitative evidence, thus maximising the quantity of information that could be collated from the existing evidence. Only 11 studies were identified as eligible for inclusion in the review, which impacts on the ability to form firm conclusions. Additionally, due to time resources we were unable to assess the methodological quality assessment of the included studies and therefore it is unclear how quality affects the findings of the review.

Implications and conclusions

The findings of the studies included in this review demonstrated that alcohol marketing is likely to have an effect on people with, or at risk of, an alcohol problem; Several studies report effects of alcohol marketing such as influences on positive alcohol-related emotions and cognitions and alcohol craving, which may translate into effects on alcohol consumption. There is also evidence that alcohol marketing is perceived to act as a trigger by people in recovery from alcohol problems and pose a risk to recovery. However, further longitudinal and experimental research is needed to determine whether alcohol marketing has a causal effect on alcohol use in these groups, including the differential effects between these groups and of different types of marketing. As highlighted in the recent article by Sargent and Babor on the causality of the relationship between exposure to alcohol marketing and underage drinking, no single scientific study will enable a judgment about causality.(12) Sargent and Babor presented a comprehensive combination of the evidence from

reviews of longitudinal studies on consumption, econometric studies, studies which demonstrate biological, psychological and social mechanisms, and experimental studies on consumption and cognition, to demonstrate a causal association exists between alcohol marketing and drinking among young people. Therefore, a similar comprehensive review of sufficient studies is required to enable a similar decision to be made regarding the effect of alcohol advertisements on alcohol use in people with, or at risk of, an alcohol problem. Unfortunately, to date the evidence base, as demonstrated by this review, is too small and thus currently precludes such a judgement.

Nevertheless, taken together, the findings of the 11 studies included in this review suggest that an effect of alcohol marketing in these populations is likely. Several studies report effects of alcohol marketing such as influences on positive alcohol-related emotions and cognitions and alcohol craving, which may translate into effects on alcohol consumption. There is also evidence that alcohol marketing is perceived to act as a trigger by people in recovery from alcohol problems and pose a risk to recovery. While the existing studies are not sufficient to conclude that there is a causal effect on alcohol use, this review demonstrates that the impact of alcohol marketing on people with or at risk of an alcohol problem should be a concern for marketing regulators and a focus for future research.

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Appendices

Appendix 1 Search strategies for electronic databases

Ovid MEDLINE(R) ALL <1946 to November 11, 2021>

- 1 Alcohol Drinking/
- 2 ethanol/
- 3 alcoholics/
- 4 alcoholism/
- 5 alcoholism.tw.
- 6 Alcohol Related Disorders/
- 7 Binge drinking/
- 8 (alcohol adj3 (drink* or intoxicat* or use* or abus* or misus* or risk* or consum* or withdraw* or detox* or treat* or therap* or excess* or reduc* or cessation or intervention* or dependen* or disorder* or addict*)).tw.
- 9 (drink* adj3 (excess* or heavy or heavily or harm or harmful or hazard* or binge or problem*)).tw.
- 10 ((excess* or heavy or heavily or harm or harmful or hazard* or binge or problem*) adj3 drink*).tw.
- 11 Alcoholic.tw.
- 12 AUD.tw.
- 13 (alcohol* adj3 (recov* or abstain*)).tw.
- 14 (Recov* adj3 (alcohol* or drink*)).tw.
- 15 Sober*.tw.
- 16 (former?drink* or ex?drink*).tw.
- 17 or/1-16
- 18 Mass media.ti,ab.
- 19 Mass communication.ti,ab.
- 20 Digital media.ti,ab.
- 21 Digital communication.ti,ab.
- 22 Social marketing.ti,ab.
- 23 Celebrity endorsement.tw.
- 24 Influencer.tw.
- 25 Competition*.tw.
- 26 Merchandise.tw.
- 27 Branded good*.tw.
- 28 Branded product*.tw.
- 29 Brand extension.tw.
- 30 Broadcast*.ti,ab.
- 31 exp mass media/
- 32 Pamphlets/
- 33 exp serial publications/
- 34 Electronic mail/
- 35 Social media/
- 36 Advert*.mp.
- 37 Campaign.mp.
- 38 Advertising/

39 Marketing/
40 Market*.tw.
41 Promotional.tw.
42 Item, Promotional/
43 Items, Promotion/
44 Health campaigns/
45 Campaigns, Health/
46 Sponsorship*.tw.
47 Store product placement.tw.
48 End of aisle.tw.
49 Online promotion.tw.
50 Price.tw.
51 Packaging.tw.
52 Discount*.tw.
53 Sale*.tw.
54 or/18-53
55 Behavio?r*.tw.
56 Behavior/
57 Behaviors/
58 Pattern*.tw.
59 Psychologi*.tw.
60 (Neurologic* adj3 manifestation*).tw.
61 Neurological manifestations/
62 or/55-61
63 Interviews as Topic/
64 Focus Groups/
65 Narration/
66 Qualitative Research/
67 "semi-structured".ti,ab.
68 semistructured.ti,ab.
69 unstructured.ti,ab.
70 structured.ti,ab.
71 informal.ti,ab.
72 in-depth.ti,ab.
73 "in-depth".ti,ab.
74 "face-to-face".ti,ab.
75 guide.ti,ab.
76 guides.ti,ab.
77 or/67-76
78 interview.ti,ab.
79 discussion.ti,ab.
80 questionnaire.ti,ab.
81 or/78-80
82 focus group.ti,ab.
83 "focus groups".ti,ab.
84 qualitative.ti,ab.
85 ethnograph\$.ti,ab.
86 field work.ti,ab.
87 fieldwork.ti,ab.

88 key informant.ti,ab.
89 or/82-88
90 63 or 64 or 65 or 66 or ((77 and 81) or 89)
91 Epidemiological studies/
92 exp cohort studies/
93 (cohort adj (study or studies)).tw.
94 Cohort analy*.tw.
95 (Follow up adj (study or studies)).tw.
96 (observational adj (study or studies)).tw.
97 Longitudinal*.tw.
98 Retrospective.tw.
99 Cross sectional.tw.
100 Cross-sectional studies/
101 or/91-100
102 Meta-analysis as Topic/
103 Meta analy*.tw.
104 Metanaly*.tw.
105 Meta-Analysis/
106 (systematic adj (review* or overview*)).tw.
107 exp Review Literature as Topic/
108 or/102-107
109 cochrane.ab.
110 embase.ab.
111 (psychlit or psyclit).ab.
112 (psychinfo or psycinfo).ab.
113 (cinahl or cinhal).ab.
114 science citation index.ab.
115 bids.ab.
116 cancerlit.ab.
117 or/109-116
118 reference list\$.ab.
119 bibliograph\$.ab.
120 hand-search\$.ab.
121 relevant journals.ab.
122 manual search\$.ab.
123 or/118-122
124 selection criteria.ab.
125 data extraction.ab.
126 124 or 125
127 Review/
128 126 and 127
129 Comment/
130 Letter/
131 Editorial/
132 animal/
133 human/
134 132 not (132 and 133)
135 or/129-131,134
136 108 or 117 or 123 or 128

137 136 not 135
138 randomized controlled trial.pt.
139 controlled clinical trial.pt.
140 randomized.pt.
141 placebo.ti,ab.
142 drug therapy.sh.
143 randomly.ti,ab.
144 trial.ti,ab.
145 groups.ti,ab.
146 or/138-145
147 exp animals/ not exp humans/
148 146 not 147
149 90 or 101 or 137 or 148
150 17 and 54 and 149

Embase <1974 to 2021 November 11>

1 Alcohol Drinking/
2 ethanol/
3 alcoholics/
4 alcoholism/
5 alcoholism.tw.
6 Alcohol Related Disorders/
7 Binge drinking/
8 (alcohol adj3 (drink* or intoxicat* or use* or abus* or misus* or risk* or
consum* or withdraw* or detox* or treat* or therap* or excess* or reduc* or cessation
or intervention* or dependen* or disorder* or addict*)).tw.
9 (drink* adj3 (excess* or heavy or heavily or harm or harmful or hazard* or
binge or problem*)).tw.
10 ((excess* or heavy or heavily or harm or harmful or hazard* or binge or
problem*) adj3 drink*).tw.
11 Alcoholic.tw.
12 AUD.tw.
13 (alcohol* adj3 (recov* or abstain*)).tw.
14 (Recov* adj3 (alcohol* or drink*)).tw.
15 Sober*.tw.
16 (former?drink* or ex?drink*).tw.
17 or/1-16
18 Mass media.ti,ab.
19 Mass communication.ti,ab.
20 Digital media.ti,ab.
21 Digital communication.ti,ab.
22 Social marketing.ti,ab.
23 Celebrity endorsement.tw.
24 Influencer.tw.
25 Competition*.tw.
26 Merchandise.tw.
27 Branded good*.tw.
28 Branded product*.tw.

29 Brand extension.tw.
30 Broadcast*.ti,ab.
31 exp mass media/
32 Pamphlets/
33 exp serial publications/
34 Electronic mail/
35 Social media/
36 Advert*.mp.
37 Campaign.mp.
38 Advertising/
39 Marketing/
40 Market*.tw.
41 Promotional.tw.
42 Promotional Items/
43 Promotion item*.tw.
44 Health campaigns/
45 health campaign*.tw.
46 Sponsorship*.tw.
47 Store product placement.tw.
48 End of aisle.tw.
49 Online promotion.tw.
50 Price.tw.
51 Packaging.tw.
52 Discount*.tw.
53 Sale*.tw.
54 or/18-53
55 Behavio?r*.tw.
56 Behavior/
57 Behaviors/
58 Pattern*.tw.
59 Psychologi*.tw.
60 (Neurologic* adj3 manifestation*).tw.
61 Neurological manifestations/
62 or/55-61
63 (("semi-structured" or semistructured or unstructured or informal or "in-depth"
or indepth or "face-to-face" or structured or guide) adj3 (interview* or discussion* or
questionnaire*)).ti,ab. or (focus group* or qualitative or ethnograph* or fieldwork or
"field work" or "key informant").tw,kw. or qualitative research/
64 Clinical study/
65 Case control study/
66 Family study/
67 Longitudinal study/
68 Retrospective study/
69 Prospective study/
70 Randomized controlled trials/
71 69 not 70
72 Cohort analysis/
73 (Cohort adj (study or studies)).mp.
74 (follow up adj (study or studies)).tw.

75 (observational adj (study or studies)).tw.
76 (epidemiologic\$ adj (study or studies)).tw.
77 (cross sectional adj (study or studies)).tw.
78 or/64-68,71-77
79 exp Meta Analysis/
80 ((meta adj analy\$) or metaanalys\$).tw.
81 (systematic adj (review\$1 or overview\$1)).tw.
82 or/79-81
83 cancerlit.ab.
84 cochrane.ab.
85 embase.ab.
86 (psychlit or psyclit).ab.
87 (psychinfo or psycinfo).ab.
88 (cinahl or cinhal).ab.
89 science citation index.ab.
90 bids.ab.
91 or/83-90
92 reference lists.ab.
93 bibliograph\$.ab.
94 hand-search\$.ab.
95 manual search\$.ab.
96 relevant journals.ab.
97 or/92-96
98 data extraction.ab.
99 selection criteria.ab.
100 98 or 99
101 review.pt.
102 100 and 101
103 letter.pt.
104 editorial.pt.
105 animal/
106 human/
107 105 not (105 and 106)
108 or/103-104,107
109 82 or 91 or 97 or 102
110 109 not 108
111 Randomized controlled trial/
112 Controlled clinical trial/
113 random\$.ti,ab.
114 randomization/
115 intermethod comparison/
116 placebo.ti,ab.
117 (compare or compared or comparison).ti.
118 ((evaluated or evaluate or evaluating or assessed or assess) and (compare or compared or comparing or comparison)).ab.
119 (open adj label).ti,ab.
120 ((double or single or doubly or singly) adj (blind or blinded or blindly)).ti,ab.
121 double blind procedure/
122 parallel group\$1.ti,ab.

- 123 (crossover or cross over).ti,ab.
 124 ((assign\$ or match or matched or allocation) adj5 (alternate or group\$1 or intervention\$1 or patient\$1 or subject\$1 or participant\$1)).ti,ab.
 125 (assigned or allocated).ti,ab.
 126 (controlled adj7 (study or design or trial)).ti,ab.
 127 (volunteer or volunteers).ti,ab.
 128 human experiment/
 129 trial.ti.
 130 or/1-19
 131 (random\$ adj sampl\$ adj7 (cross section\$ or questionnaire\$1 or survey\$ or database\$1)).ti,ab. not (comparative study/ or controlled study/ or randomi?ed controlled.ti,ab. or randomly assigned.ti,ab.)
 132 Cross-sectional study/ not (randomized controlled trial/ or controlled clinical study/ or controlled study/ or randomi?ed controlled.ti,ab. or control group\$1.ti,ab.)
- 133 (((case adj control\$) and random\$) not randomi?ed controlled).ti,ab.
 134 (Systematic review not (trial or study)).ti.
 135 (nonrandom\$ not random\$).ti,ab.
 136 Random field\$.ti,ab.
 137 (random cluster adj3 sampl\$).ti,ab.
 138 (review.ab. and review.pt.) not trial.ti.
 139 we searched.ab. and (review.ti. or review.pt.)
 140 update review.ab.
 141 (databases adj4 searched).ab.
 142 (rat or rats or mouse or mice or swine or porcine or murine or sheep or lambs or pigs or piglets or rabbit or rabbits or cat or cats or dog or dogs or cattle or bovine or monkey or monkeys or trout or marmoset\$1).ti. and animal experiment/
 143 Animal experiment/ not (human experiment/ or human/
 144 or/131-143
 145 130 not 144
 146 63 or 78 or 110 or 145
 147 17 and 54 and 146

APA PsycInfo <1806 to November Week 2 2021>

- 1 Alcoholics/
 2 ethanol/
 3 alcoholics/
 4 alcoholism/
 5 alcoholism.tw.
 6 Alcohol Abuse/
 7 Binge drinking/
 8 (alcohol adj3 (drink* or intoxicat* or use* or abus* or misus* or risk* or consum* or withdraw* or detox* or treat* or therap* or excess* or reduc* or cessation or intervention* or dependen* or disorder* or addict*)).tw.
 9 (drink* adj3 (excess* or heavy or heavily or harm or harmful or hazard* or binge or problem*)).tw.
 10 ((excess* or heavy or heavily or harm or harmful or hazard* or binge or problem*) adj3 drink*).tw.

11 Alcoholic.tw.
12 AUD.tw.
13 (alcohol* adj3 (recov* or abstain*)).tw.
14 (Recov* adj3 (alcohol* or drink*)).tw.
15 Sober*.tw.
16 (former?drink* or ex?drink*).tw.
17 or/1-16
18 Mass media.ti,ab.
19 Mass communication.ti,ab.
20 Digital media.ti,ab.
21 Digital communication.ti,ab.
22 Social marketing.ti,ab.
23 Celebrity endorsement.tw.
24 Influencer.tw.
25 Competition*.tw.
26 Merchandise.tw.
27 Branded good*.tw.
28 Branded product*.tw.
29 Brand extension.tw.
30 Broadcast*.ti,ab.
31 exp mass media/
32 Reading Materials/
33 Electronic mail/
34 Social media/
35 Advert*.mp.
36 Campaign.mp.
37 Advertising/
38 Marketing/
39 Market*.tw.
40 Promotional.tw.
41 Promotional items.tw.
42 Health campaign*.tw.
43 Sponsorship*.tw.
44 Store product placement.tw.
45 End of aisle.tw.
46 Online promotion.tw.
47 Price.tw.
48 Packaging.tw.
49 Discount*.tw.
50 Sale*.tw.
51 or/18-50
52 (((("semi-structured" or semistructured or unstructured or informal or "in-depth" or indepth or "face-to-face" or structured or guide or guides) adj3 (interview* or discussion* or questionnaire*)) or (focus group* or qualitative or ethnograph* or fieldwork or "field work" or "key informant")).ti,ab,id. or exp qualitative research/ or exp interviews/ or exp group discussion/ or qualitative study.md.) not "Literature Review".md.

53 ((cohort or longitudinal or prospective or retrospective).ti,ab,id. or longitudinal study.md. or prospective study.md. or retrospective study.md.) not "Literature Review".md.

54 (((comprehensive* or integrative or systematic*) adj3 (bibliographic* or review* or literature)) or (meta-analy* or metaanaly* or "research synthesis" or ((information or data) adj3 synthesis) or (data adj2 extract*))).ti,ab,id. or ((review adj5 (rationale or evidence)).ti,ab,id. and "Literature Review".md.) or (cinahl or (cochrane adj3 trial*) or embase or medline or psyclit or pubmed or scopus or "sociological abstracts" or "web of science").ab. or ("systematic review" or "meta analysis").md.

55 (double-blind or random: assigned or control).tw.

56 or/52-55

57 17 and 51 and 56



Appendix 2 Summary of characteristics of included studies

Table A2.1: Study characteristics heavy / hazardous drinkers

Authors and year	Title	Population	Criteria for heavy drinking	Study design	Country	Summary method	Summary results	Summary of author conclusion
Cross-sectional								
Noel et al 2018	Perceptions of Alcohol Advertising among High Risk Drinkers	326 students, higher AUDIT scores considered to have history of excessive alcohol abuse. Age 18-79	Classified according to AUDIT zones. Categories II-IV considered heavy alcohol users (42.3%)	Secondary data analysis of experimental study	US	Participants viewed five unique branded alcohol advertisements-four TV and one print. After viewing each ad, participants completed a 48 -item questionnaire based on the US Beer Institute's Marketing and Advertising code	Individuals' alcohol use history was positively related to ad appeal, total perceived alcohol consumption (and perceived high levels of consumption as 'responsible')	Heavy alcohol users may be a vulnerable population and marketing codes should be revised to include stricter regulations to protect heavy alcohol users from the effects of

								alcohol advertising
Petersen-Williams et al 2019	Alcohol Advertising, Affordability and Availability, and the Effect on Adult Heavy Drinking and Symptoms of Alcohol Problems: International Alcohol Control Study (South Africa)	445 non-heavy drinkers, 510 heavy drinkers. Age groups 18-19 to 55-65	Heavy drinking was defined as consuming at least 120ml for men and 90ml for women of absolute alcohol on one occasion at least monthly; symptoms of alcohol problems were measured using the Rapid Alcohol Problems Screen 4 (RAPS4)	cross sectional (household survey)	South Africa	Household survey using standard International Alcohol Control (IAC) questionnaire to assess patterns of alcohol consumption and the impact of alcohol control policy. Relevant questions relating to demographic factors, alcohol marketing/advertising, affordability and availability	A greater proportion of heavy drinkers have noticed brands being advertised on sponsoring sports, sponsoring music events, signs or posters, on clothing, special price offers on TV, famous people promoting it, in SMSs, on the radio, free offers when buying alcohol and magazines or newspapers as compared to their non-heavy drinking counterparts. Similar results were reported for those with symptoms of alcohol problems.	Various alcohol advertising mechanisms can be associated with the risk of alcohol-related problems. The study results raise questions about alcohol advertisements in magazines and newspapers and supports forging ahead with restrictions on alcohol advertising.

Experimental								
Kreusch et al 2013	Response inhibition toward alcohol-related cues using an alcohol go/no-go task in problem and non-problem drinkers according to cut off of 11 on AUDIT scores	75 undergraduate students (40F, 35M). 4 males excluded, 71 in sample.....16 female problem drinkers, 19 male problem drinkers. Mean age 21.1	AUDIT score of 11 or above	Experimental study (only experiment one relevant)	Belgium	36 non-problem drinkers and 35 problem drinker students completed a modified alcohol go/no-go task and neutral object pictures, with or without brand logos, as stimuli	All participants showed a cognitive bias toward alcohol cues evidenced by reduced reaction times and higher false alarms observed for alcohol cues. Problem drinkers showed faster reaction times for alcohol cues without brand logos; alcohol brand logos affect reaction times only in non-problem drinkers.	Stronger cognitive biases in the treatment of alcohol cues were observed on problem drinkers, although differences between problem and non-problem drinkers were relatively small scale and required specific experimental parameters to be uncovered
Stautz et al. 2017	Impact of alcohol-promoting and alcohol-warning advertisements on alcohol consumption, affect, and implicit cognition in heavy-drinking young	204 heavy drinking young adults. Age 18-25	AUDIT-C scores above 5 (range 5-11)	Experimental (between participant RCT)	UK	Participants viewed a set of 10 advertisements (randomised to one condition) that included Impact of alcohol advertisements either 1.branded alcohol-promoting	Participants exposed to alcohol-promoting advertisements showed increased positive affect and an increased approach/reduced avoidance bias	Restricting alcohol-promoting advertising could remove a potential influence on positive

	adults: A laboratory-based randomized controlled trial					advertisements; 2.alcohol-warning advertisements, or 3. only non-alcohol advertisements before completing the outcome measures. To assess possible dose–response effects of advertising exposure, participants in the alcohol- promoting and alcohol-warning advertisement conditions were further randomized to view between 5 and 10 condition-specific advertisements, with the remaining advertisements being non-alcohol filler advertisements	towards alcohol relative to those exposed to non-alcohol advertisements	alcohol-related emotions and cognitions among heavy drinking young adults
Alhabash et al 2021	Saw It on Facebook, Drank It at the Bar! Effects of Exposure to Facebook Alcohol Ads on Alcohol-Related Behaviors	121 adults aged 21+, average AUDIT score 6,56 (SD 4.40, range 0-24)	Audit scores were categorised as low (2.17), moderate (6.56) or high (10.96) for analyses	Experimental (between participant RCT)	US	Participants were randomly assigned to one of four conditions. In each condition, participants were exposed to three ads, each followed questions related to attitudes toward the ad, attitudes toward the brand, viral	Intention to consume alcohol was not affected by AUDIT score, however increasing levels of AUDIT were associated with a greater intention to consume alcohol as a function of exposure to beer	Findings suggest alcohol ads encourage individuals to drink and engage in risky behaviours. The findings provide policymakers

						<p>behavioural intentions, and intentions to consume alcohol. The ads were identical across the four conditions, with the exception of brand being either familiar beer, unfamiliar beer, familiar water and unfamiliar water. Participants were offered a gift card for a local bar or coffee shop as part of the experiment and reward for participation</p>	<p>rather than water advertisements. Brand familiarity increased intention to consume alcohol upon exposure to beer ads for those with moderate AUDIT scores, and more still in those with high AUDIT scores. Participants exposed to beer advertisements were more likely to select the bar gift card but there was no moderating effect of AUDIT score</p>	<p>with evidence to call for stricter regulation of social media and social networking sites in relation to the availability of alcohol cues and content</p>
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Table A2.2: Study characteristics drinkers in recovery

Authors and year	Title	Population	Criteria for heavy drinking	Study design	Country	Summary method	Summary results	Summary of author conclusion
Cross-sectional								
Guillou Landreat et al 2020	Alcohol use disorders, beverage preferences and the influence of alcohol marketing: a preliminary study	91 patients with alcohol use disorder seeking treatment (80 with severe AUD, 11 with moderate AUD). Age 15-49	Audit score of 9 or above, confirmed by DSM-V criteria	cross sectional descriptive	France	Survey to define the types of marketing identified by treatment seeking individuals with alcohol use disorder and their drink preferences. Asked questions relating to alcohol marketing perception, personal and familial history and socio-demographic variables	72% of participants said they were not influenced by alcohol marketing, but 76% recalled an alcohol advertisement in the last 6 months.	Vulnerable patients with AUD in this study were widely exposed to alcohol marketing cues without being aware of this exposure. The study findings highlight the importance of reconsidering the issue of alcohol marketing in France, at a time where legislation is weakened, to help limit exposure to alcohol stimuli among vulnerable populations

Experimental								
Witteman et al 2015	Cue reactivity and its relation to craving and relapse in alcohol dependence: a combined laboratory and field study	80 male alcoholics enrolled in detoxification treatment. Age 25-64	DSM-IV diagnosis of alcohol dependence for the 12 months leading up to admission to the addiction centre	Experimental	The Netherlands	Physiological reactivity and craving in response to experimental exposure to alcohol and soft drink advertisements were measured during detoxification treatment using heart rate variability and subjective rating of craving. Post discharge, patients measured exposure to alcohol advertisements and were assessed for relapse at 5 weeks and 3 months post discharge	No difference in heart rate variability following exposure to alcohol or soft drink advertisements. Significantly higher craving level after viewing an alcohol advertisement, though absolute values were relatively low. At follow up, participants reported substantial daily exposure to alcohol advertisements but no relationship with drinking behaviour was found	Alcohol-cue exposure, and more specifically alcohol advertisement, causes a robust craving response in alcohol dependent patients. Further, display of an alcoholic beverage, individuals preparing to drink and actual drinking behaviour seem to drive physiological cue reactivity and craving in response to alcohol advertisement, likely through an appetitive conditioned response, as predicted by incentive salience theory.

								Reducing alcohol cues in advertisements could, theoretically, reduce the occurrence of episodes of acute craving and cue reactivity in alcohol-dependent patients.
Qualitative								
Treise et al 2008	How Recovering Alcoholics Interpret Alcoholic-Beverage Advertising	20 recovering alcoholics enrolled in alcohol dependency treatment programmes aged 25-64 years		Qualitative (interviews)	US	Interviews	Recovering alcoholics, particularly in the early stages of treatment, view alcohol advertising and the images and techniques used within such ads to be triggers to further drinking	For at least some alcoholics, alcoholic beverage advertising impedes the recovery process
Thomson et al 1997	A qualitative investigation of the responses of in-treatment and recovering heavy drinkers to alcohol	21 recovering alcoholics / in treatment		Qualitative (interviews)	New Zealand	Semi-structured interviews – discussion about advertising followed by viewing a video	Respondents found adverts appealing, particularly if they showed their preferred drink.	Advertising on television makes abstinence from alcohol difficult and

	advertising on New Zealand television					containing 6 advertisements with discussion about how these adverts made participants feel	Participants often experienced negative emotions when exposed to alcohol advertising and feelings of being excluded from normal life. Television was viewed as a particularly powerful medium, making abstinence more difficult and intruding into their own home	contributes to a hostile environment for those seeking to decrease the impact of problematic drinking.
Shortt et al 2017	Place and recovery from alcohol dependence: A journey through photovoice	9 subjects in alcohol dependence recovery (5 male 4 female). Age 31-52	Reported as in recovery from alcohol use, attending a 'recovery café'	Qualitative (focus groups and photovoice)	Scotland	Series of workshops followed by provision of a digital camera to pairs of participants to take pictures over a 2 week period to document the features of the environment that enable and/or hinder	The retail environment, including both the sale and marketing of alcohol, was the biggest single element of risk to recovery identified	The issue of the retail environment, including marketing, leads to questions over the commonness of alcohol in the environment and the specific challenges of treating as an

						their journey of recovery		everyday commodity
Guillou-Landreat et al	L'impact du marketing de l'alcool chez_ les_ personnes alcoolodépendantes: étude qualitative Personal communication, 2021	23 patients aged 24-60 with AUD	Patients presenting with alcohol use disorder and attending addiction services	Qualitative (interviews)	France	Semi-structured interviews	The majority of participants (17) reported often seeing alcohol marketing messages and felt that alcohol marketing encourages consumption and purchase of alcohol. When shown a range of marketing stimuli, the majority of participants tended to say that they encouraged drinking, even for advertisements that were negatively perceived.	None reported.