Effectiveness of Mass Media Campaigns to Reduce Alcohol Consumption and Harm: A Systematic Review

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Abstract

Aims: To assess the effectiveness of mass media messages to reduce alcohol consumption and related harms using a systematic literature review.

Methods: Eight databases were searched along with reference lists of eligible studies. Studies of any design in any country were included, provided that they evaluated a mass media intervention targeting alcohol consumption or related behavioural, social cognitive or clinical outcomes. Drink driving interventions and college campus campaigns were ineligible. Studies quality were assessed, data were extracted and a narrative synthesis conducted.

Results: Searches produced 10,212 results and 24 studies were included in the review. Most campaigns used TV or radio in combination with other media channels were conducted in developed countries and were of weak quality. There was little evidence of reductions in alcohol consumption associated with exposure to campaigns based on 13 studies which measured consumption, although most did not state this as a specific aim of the campaign. There were some increases in treatment seeking and information seeking and mixed evidence of changes in intentions, motivation, beliefs and attitudes about alcohol. Campaigns were associated with increases in knowledge about alcohol consumption, especially where levels had initially been low. Recall of campaigns was high.

Conclusion: Mass media health campaigns about alcohol are often recalled by individuals, have achieved changes in knowledge, attitudes and beliefs about alcohol but there is little evidence of reductions in alcohol consumption.

Short summary: There is little evidence that mass media campaigns have reduced alcohol consumption although most did not state that they aimed to do so. Studies show recall of campaigns is high and that they can have an impact on knowledge, attitudes and beliefs about alcohol consumption.
INTRODUCTION

Alcohol consumption is a major risk factor for adverse health, accounting for 2.3 million global deaths annually and representing the ninth greatest risk factor for disability-adjusted life-years (GBD 2015 Risk Factors Collaborators, 2016). In most countries, the trend in alcohol consumption is either increasing or stable (WHO, 2014), indicating a need for effective population-level strategies to reduce consumption and prevent related harms. Price increases and restrictions on the availability of alcohol can reduce alcohol-related harm (Anderson et al., 2009; Martineau et al., 2013; Allamani et al., 2017).

Other population-level strategies include education and information, often using mass media with an aim to communicate messages cost-effectively to large numbers of people.

Mass media campaigns can directly or indirectly lead to health behaviour change in populations, but existing evidence varies depending on the type of behaviour being targeted (Wakefield et al., 2010). For example, there is a substantial body of evidence assessing their role in reducing tobacco use (Bala et al., 2013) and promoting physical activity (Abioye et al., 2013). However, it is unclear whether mass media is an effective strategy to reduce alcohol consumption and related harm.

There is some evidence that mass media campaigns can, under certain conditions, reduce drink driving (Elder et al., 2004; Jepson et al., 2010) but little evidence that they have reduced alcohol-related road accidents or related injuries and deaths (Yadav and Kobayashi, 2015). A meta-analysis of media interventions to reduce youth substance use reported that messages addressing alcohol were associated with desired changes (single group pre-post) in consumption, attitudes and knowledge (Derzon and Lipsey, 2002). A meta-analysis of US mass media interventions reported a small effect on alcohol consumption based on four studies (Snyder et al., 2004). Other systematic review evidence suggests social norm campaigns targeting college students are ineffective at preventing alcohol misuse (Foxcroft et al., 2015) and provides mixed evidence of the effectiveness of school-based campaigns (Foxcroft and Tsertsvadze, 2011). Responsible drinking campaigns conducted by the alcohol industry are perceived as ambiguous by audiences and are ineffective at changing behaviour (Smith et al., 2006).

Other than the topics already highlighted, evaluations of alcohol-related campaigns have not been synthesized in a way that can inform current policy. The aim of this study was to systematically review evidence for the effectiveness of mass media public health campaigns to reduce alcohol consumption and related harms.

METHOD

The review protocol was submitted to the International Prospective Register of Systematic Reviews (PROSPERO) ref. CRD42017054999. The Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) were followed.

Inclusion criteria

Studies evaluating a mass media campaign aimed at reducing alcohol consumption (and its determinants) were eligible for inclusion. Mass media campaigns were defined as purposeful use of mass media channels to influence health behaviours and the individual level determinants of health behaviours. Mass media channels included television, radio, cinema, online broadcasting, newspapers and magazines, leaflets/booklets, direct mail, outdoor advertising, email and digital media. Studies had to have reported at least one of the following outcomes: alcohol consumption; alcohol-related social cognitive variables (e.g., knowledge, intentions, social norms); exposure outcomes (e.g., campaign awareness, exposure, understanding); alcohol-related harm; health service usage. Studies of multi-component interventions were eligible if they assessed the specific effects of a mass media component. Reports of primary research studies of any study design and conducted in any country, reported in English, were eligible for inclusion in the review. Exclusion criteria are listed in the Supplementary material (Supplementary Table S1).

Search strategy

The following databases were searched from date of inception to July 2016: Medline, EMBASE, PubMed, Cochrane Library, Web of Science, SCOPUS, ASSIA and ERIC. The search terms used for Medline are shown in the Supplementary material (Supplementary Table S2) and were adapted for each database. Titles and abstracts were imported to an online database (Thomas et al., 2010) and screened for relevance by one of a team of four reviewers. Full-text reports of all potentially eligible studies were retrieved and assessed for eligibility by one reviewer. A second reviewer assessed random samples of included (n = 10) and excluded (n = 10) studies at an early stage of the screening process to check agreement with the decisions and checked a further random sample (n = 20) once screening was complete. Conference abstracts of eligible studies were included only if a full-text paper of the same study could be located via searches of PubMed, Web of Science and Google Scholar. References of included studies were searched for any further potentially relevant studies.

Data extraction

Study and campaign characteristics and relevant outcome data were extracted. Study design classifications were guided by the Cochrane Handbook tables of study design features (Reeves et al., 2011). A second reviewer double-extracted data from a sample of studies and the two versions were checked for agreement. A further sample of studies was checked for accuracy by a second reviewer.

Quality assessment

Included studies were assessed for methodological quality using the Effective Public Health Practice Project (EPHPP) Quality Assessment Tool for Quantitative Studies. Assessments were checked for accuracy by a second reviewer. The tool has six scored domains: selection bias, study design, confounders, blinding, data collection methods and withdrawal and dropouts. The overall quality of a study can be rated as strong, moderate or weak. Studies rated as weak on at least two domains are assigned an overall rating of weak.

Synthesis

A narrative synthesis was conducted first to synthesize evidence of behaviour change and then by its determinants, including social cognitive and exposure outcomes. We privilege studies with high quality within the narrative synthesis (Katikireddi et al., 2015). Due to study heterogeneity, a meta-analysis was not possible.

RESULTS

Study selection

Searches produced 10,212 unique results and 170 of these were assessed for eligibility as a full-text report (Fig. 1). Twenty-nine papers were eligible for inclusion in the review, reporting 24 studies.
Characteristics of included studies are shown in Table 1. Eight studies were conducted in the USA, five in Australia, two each in Finland, New Zealand and the UK, and one each in Canada, Denmark, Italy, the Netherlands and Sri Lanka. No campaigns were described as alcohol industry-funded.

Study quality

Two studies were rated strong quality (Flynn et al., 2006; Scheier and Grenard, 2010), four were rated moderate quality (Wallack and Barrows, 1982; Barber and Grichting, 1990; Kypri et al., 2003; Lowe et al., 2010) and 18 were rated weak quality (Plant et al., 1979; Barber et al., 1989; Casswell et al., 1990; Casiro et al., 1994; Allamani et al., 2000; Kelley et al., 2000; Grønbæk et al., 2001; Surkan et al., 2003; Karlsson et al., 2005; Awope et al., 2008; Kaarainen et al., 2008; Atkinson et al., 2011; van Gemert et al., 2011; Hansson et al., 2012; Siriwardhana et al., 2013; van Leeuwen et al., 2013; Dixon et al., 2015; Trees, 2015). EPHPP tool domain ratings indicated 20 studies did not report reliability and validity of data collection tools, ten studies had high risk of selection bias and nine were rated weak on study design (Table 2).

Synthesis of results

Table 3 summarizes the findings of included studies, structured by different types of outcomes: health, social and behavioural outcomes (e.g. mortality, societal change, health behaviour), health promotion outcomes (e.g. knowledge, attitudes, behavioural intentions) and exposure outcomes (e.g. recall, understanding, onward transmission). More detailed results of included studies are shown in the Supplementary Table S3.

### Alcohol consumption

Thirteen studies reported the effects of mass media campaigns on alcohol consumption. Six of the campaigns aimed to reduce consumption (Wallack and Barrows, 1982; Barber et al., 1989; Grønbæk et al., 2001; Karlsson et al., 2005; Flynn et al., 2006; Scheier and Grenard, 2010) while the other seven aimed to impact knowledge (Plant et al., 1979; Barber and Grichting, 1990; Kypri et al., 2003; Hansson et al., 2012; Dixon et al., 2013; Trees, 2013), beliefs (van Leeuwen et al., 2013), attitudes (Kypri et al., 2005), treatment seeking (Plant et al., 1979) or supply of alcohol (Kypri et al., 2005). There was little evidence of reductions in alcohol consumption associated with exposure to campaigns. Six of the studies compared exposed and non-exposed groups, or exposed groups over time, five reporting no statistically significant differences in alcohol consumption (1 strong quality, 3 moderate, 1 weak) (Wallack and Barrows, 1982; Barber and Grichting, 1990; Karlsson et al., 2005; Kypri et al., 2005; Flynn et al., 2006). One study (weak quality) found a significant effect of a TV and mailed letter campaign (Barber et al., 1989). Consumption on a typical day decreased 47%, contrasting with increases in groups receiving either the TV or letter components or no intervention. Of four studies that examined associations between campaign viewing or awareness (rather than group allocation) and alcohol consumption, one study (strong quality) reported that increases in campaign awareness in older adolescence, but not younger adolescence, was associated with decreases in binge drinking (Scheier and Grenard, 2010), one study (weak quality) found no significant influence of frequency of drinks consumed per occasion (van Leeuwen et al., 2013) and two studies of weak quality found no significant difference in consumption (Plant et al., 1979; Dixon et al., 2015).

### Treatment/information seeking

There was some evidence that mass media campaigns generated increases in treatment seeking or information seeking, from a total of four studies reporting this outcome (all weak quality). One of the campaigns had an aim to promote interest in and understanding of alcohol treatment (Grønbæk et al., 2001) while three campaigns had other aims (Plant et al., 1979; Allamani et al., 2000; Awope et al., 2008). New referrals for alcoholism increased by 65% following a TV and radio campaign (Plant et al., 1979). Forty-nine Foetal Alcohol Syndrome-related telephone calls were received by a Family Health Line following a campaign, compared to 5–6 calls received in a historical period (Awope et al., 2008). Evaluation of a long-term national annual campaign found 6–7% had obtained an alcohol unit counter and 2% (~80,000 people) had used or considered using it (Grønbæk et al., 2001). The other study reported mixed qualitative evidence which was difficult to interpret (Allamani et al., 2000).

### Intentions and motivation

Three studies reported intentions to reduce alcohol consumption. One of the campaigns aimed to reduce consumption (Wallack and Barrows, 1982), one aimed to influence beliefs (van Leeuwen et al., 2013) and one aimed to promote knowledge (Dixon et al., 2015). The first study (moderate quality) reported that some respondents indicated they might change their behaviour but no further data were provided (Wallack and Barrows, 1982). The second study (weak quality) compared those who reported they had seen the campaign to those who did not. Viewing status significantly predicted changes in intentions to decrease alcohol use; viewers increased their intentions whereas...
| Campaigns targeting general adult populations          | Population | Campaign                      |
|------------------------------------------------------|------------|-------------------------------|
| Allamani et al. (2000)                               |            |                               |
| Cross-sectional                                     |            |                               |
| Campaign location and reach                          |            |                               |
| Rifredi Health District (population 16,900), Florence, Italy. 5,000 carousels were disseminated |            |                               |
| Campaign context                                    |            |                               |
| A component of a 6-year community alcohol project, which included a school program unit and training for healthcare workers and volunteers. The project had an aim to change local alcohol policy. Local TV and newspapers publicized the ‘carousel’ initiative prior to its implementation |            |                               |
| Target population                                   |            |                               |
| Whole community                                     |            |                               |
| Comparison group                                    |            |                               |
| None                                                 |            |                               |
| Campaign objective                                  |            | Increase awareness about responsible consumption of wine and other alcoholic drinks |
| Media channel(s)                                    |            | Posters displayed in buses.    |
|                                                     |            | ‘Carousel’ information tool (rotatable disk presented in a yellow envelope with ‘Take home a carousel’ printed on the outside) distributed via racks at GPs, pharmacies, schools, shops and bars, sent by mail to homes and distributed at local events |
| Barber et al. (1989)                                |            |                               |
| Cluster non-randomized controlled trial (exposure to pre-campaign letter in both groups was randomized at the individual level, forming a 2 × 2 design) |            |                               |
| Campaign location and reach                          |            |                               |
| Townsville, North Queensland, Australia. Local reach  |            |                               |
| Target population                                   |            |                               |
| Adult alcohol drinkers                               |            |                               |
| Comparison group                                    |            |                               |
| Community (Cairns) not exposed to TV advertisement but sent pre-campaign letters |            |                               |
| Campaign objective                                  |            | Reduce alcohol consumption    |
| Media channel(s)                                    |            | TV advertisement, pre-campaign postal letter |
| Barber (1990)                                       |            |                               |
| Uncontrolled before and after study with a separate exposed group measured post-campaign only |            |                               |
| Campaign location and reach                          |            |                               |
| Australia, national reach                            |            |                               |
| Campaign context                                    |            |                               |
| The beginning of a government 3-year National Campaign Against Drug Abuse |            |                               |
| Target population                                   |            |                               |
| The general population                               |            |                               |
| Comparison group                                    |            |                               |
| None                                                 |            |                               |
| Campaign objective                                  |            | Educate the public in the responsible use of drugs, with an emphasis on attitudes. Sought to raise public concern about the prevention of drug abuse generally |
| Media channel(s)                                    |            | Radio, television and newspaper advertisements. Printed glossy booklet delivered to homes |
| Casswell et al. (1990)                               |            |                               |
| Cluster non-randomized controlled trial with separate repeated cross-sectional component |            |                               |
| Campaign location and reach                          |            |                               |
| Four cities in New Zealand (each of 40,000–60,000 population). Local media channels used |            |                               |
| Target population                                   |            |                               |
| Initially males 18–30 years, subsequently males 16–20 years. |            |                               |
| Comparison group                                    |            |                               |
| Group exposed to mass media campaign plus community action. Control group not exposed to mass media or community action. |            |                               |
| Campaign location and reach                          |            |                               |
| Western Australia, state-wide                        |            |                               |
| Target population                                   |            |                               |
| Women aged 25–54                                     |            |                               |
| Comparison group                                    |            |                               |
| None                                                 |            |                               |
| Campaign location and reach                          |            |                               |
| Campaign objective                                  |            | Increase awareness and support for relevant public policy on alcohol use. Change attitudes about alcohol use (more moderated drinking patterns and shift to non-alcoholic drinks). Wider community-level objectives included an increasing the amount of alcohol-related material (excluding industry promotion) in the local print media and radio programmes |
| Media channel(s)                                    |            | Television, radio, newspaper, posters, cinema advertisements |
|                                                     |            | Campaign objective            |
|                                                     |            | Increase awareness of the link between alcohol and cancer among women. Specifically, the campaign aimed to increase awareness of long-term risky drinking, particularly in relation to alcohol-caused cancer |
| Dixon et al. (2015)                                  |            |                               |
| Interrupted time series                             |            |                               |
| Campaign location and reach                          |            |                               |
| Western Australia, state-wide                        |            |                               |
| Target population                                   |            |                               |
| Women aged 25–54                                     |            |                               |
| Comparison group                                    |            |                               |
| None                                                 |            |                               |
| Campaign location and reach                          |            |                               |
| Campaign objective                                  |            | Increase awareness of the link between alcohol and cancer among women. Specifically, the campaign aimed to increase awareness of long-term risky drinking, particularly in relation to alcohol-caused cancer |
| Media channel(s)                                    |            | TV advertisements supported by print advertisements, community posters, web-based information and unpaid media strategies |
| Campaign objective                                  |            |                               |

Continued
| References and study design | Population | Campaign |
|-----------------------------|------------|----------|
| **Grønbæk et al. (2001)**  | Denmark, national reach | Highlight alcohol consumption in order to promote interest in and understanding of alcohol prevention and treatment. Raise awareness and knowledge among adults of sensible levels of alcohol consumption. Reduce the consumption of alcohol in the whole of society in order to prevent alcohol-related injuries. The long-term objective of the annual campaigns was to bring about a reduction in the consumption of alcohol in Denmark |
| Interrupted time series     | Different target groups in different years e.g. people in their forties, heavy drinkers, whole population | Media channel(s) |
|                            | Comparison group | Television spots, information trailers and advertisements, booklet, newspaper advertisements, direct mail, outdoor media, alcohol unit counter tools |
|                            | None            | |
| **Kaariainen et al. (2008)** | Tampere, Finland. All households (200,000 population and 90,000 households) | Promote a change in the culture of alcohol consumption and increase open discussion about alcohol |
| Cross-sectional            | General population | Media channel(s) |
|                            | Comparison group | A pamphlet, designed for the campaign, delivered to homes |
| **Karlsson et al. (2005)**  | Helsinki, Finland. Eight postal areas (86,400 households) | Support self-control of drinking |
| Cluster quasi-randomized controlled trial | Males 30–49 years | Media channel(s) |
|                            | Eight postal areas not receiving the pamphlet (40,900 households) | Information pamphlet, specially designed and delivered to homes, the size of a CD cover |
| **Plant et al. (1979)**     | Scotland, UK. Regional reach | Persuade alcoholics to seek treatment and educate the public about alcoholism and agencies available to help problem drinkers. The possibility was also envisaged that the campaign might lead to a reduction in alcohol consumption by the general public, at least in the short term, although this was not a primary objective |
| Cohort study with independent samples pre- and post-test | Alcoholics and the general public | Media channel(s) |
|                            | Comparison group | TV films and newspaper advertisements |
|                            | None            | |
| **Siriwardhana et al. (2013)** | Sri Lanka, rural village, local reach | Educate the community about low-risk drinking (less than the equivalent of three standard drinks a day). Highlight the benefits of restricting amounts of drinking |
| Cross-sectional for mass media outcomes but study included a cluster-randomized controlled design | Adult males | Media channel(s) |
|                            | None for mass media outcomes | Posters, recordings of street dramas distributed on DVD and leaflets delivered to homes |
|                            | Campaign location and reach | Campaign objective |
|                            | City of Stockton in San Joaquin County, California, USA | Reduce the consumption of alcoholic beverages and lower the incidence of alcohol-related problems in the general population. Encourage more responsible drinking practices among current drinkers and thus obviate the need for treatment. Increase awareness and level of information about alcohol. Change attitudes regarding alcohol use |
| **Wallack (1982)**          | About half of Oakland and the city of San Leandro in Alameda County and the cities of El Cerrito, Richmond and San Pablo in Contra Costa County, California, USA | Media channel(s) |
| Repeated cross-sectional with control group | Initially males 18–35 years. Expanded to include females 25–40 years, Spanish heritage people and youth 14–17 years | Television, radio, billboard displays, bus cards |
|                            | City of Stockton in San Joaquin County, California, USA | |
### Table 1. Continued

| Campaigns targeting young people and/or their parents | Population | Campaign |
|-------------------------------------------------------|------------|----------|
| **References and study design** | **Campaign location and reach** | **Campaign objective** |
| Atkinson *et al.* (2011) Qualitative | UK. 943,644 views (unclear if all from UK) | Create peer to peer conversations regarding the negative effects of binge drinking. |
| | Young people | The long-term aim of the campaign was to create behaviour change by delivering sensible drinking messages in a non-patronizing way through the Hollyoaks brand |
| | None | Media channel(s) |
| | | Online video reinforced and promoted through online discussion boards, character social media pages and blogs/video blogs, interviews with actors and interactive features such as a quiz, which assessed viewers’ recall of storylines, alcohol units and binge drinking knowledge and statistics relating to the negative effects of alcohol consumption |
| | | **Campaign location and reach** |
| | | Vermont, USA. Local reach |
| | | Adolescents in 8 school districts in grades 4–5 at start of intervention and grades 7–8 at end, parents of youth ages 9–13 and retail clerks |
| | | Adolescents in grades 7–8 in the 8 school districts which received no intervention |
| | | **Comparison group** |
| | | Adolescents in 8 school districts in grades 4–5 at start of intervention and grades 7–8 at end, parents of youth ages 9–13 and retail clerks |
| | | Adolescents in grades 7–8 in the 8 school districts which received no intervention |
| | | **Media channel(s)** |
| | | Television (youth and parents), radio (parents) and video (retail clerks) |
| | | **Campaign objective** |
| | | Combat alcohol and tobacco use |
| | | Broadcast media (radio and TV), print media (newspaper, billboard), posters and tray liners in the school cafeteria and local fast food restaurants |
| | | **Campaign location and reach** |
| | | Colorado, New Jersey and Washington, USA. Four rural communities each with populations of <30,000 |
| | | **Target population** |
| | | Adolescent females |
| | | **Comparison group** |
| | | None |
| | | **Media channel(s)** |
| | | **Campaign objective** |
| | | (i) Increase the knowledge of adults in the Ashburton and Waitaki districts of the risks of supplying alcohol to teenagers; (ii) encourage a change of attitude such that a teenager’s parent is considered the only appropriate supplier of alcohol, and that teenage drinking should occur only under adult supervision; and (iii) effect a reduction in the percentage of adults who supply alcohol to teenagers for unsupervised consumption |
| | | Local newspaper, print media, local radio, media events, billboard advertisements, the distribution of printed material and the presentation of campaign information at point of sale. In two communities, a range of awareness-raising events for youth and adults were held |
| | | Educate and enable America’s youths to reject illegal drugs. Reduce adolescent initiation of drug use. Curtail use among those already engaged |
| | | **Campaign location and reach** |
| | | USA, national campaign |
| | | **Target population** |
| | | Youth 9–18 years and their parents. Other influential adults (e.g. staff at alcohol selling outlets) |
| References and study design | Population | Campaign |
|----------------------------|------------|----------|
|                            | Comparison group | Radio, television, newspapers, magazines, movies, billboards, advertisements on buses, at malls, at sports events |
| Surkan et al. (2003)       | None | Campaign objective: Promote parent-child communication about alcohol use |
| Cross-sectional            | Campaign location and reach | Media channel(s): Radio advertisement (paid) |
|                            | Massachusetts, USA. Radio stations reaching Boston, Worcester, Cape Cod, Franklin County, New Bedford area and Springfield area | |
|                            | Target population | Parents |
|                            | Comparison group | None |
| Trees (2015)               | None | Campaign objective: Alcohol awareness |
| Cross-sectional and qualitative | Campaign location and reach | Media channel(s): Television and radio (both local) |
|                            | Broome and surrounding areas, Western Australia. Local reach | |
|                            | Target population | Indigenous youth in Broome and the wider Kimberley region (the broadcast area of Goolarri TV and Radio) |
|                            | Comparison group | None |
| van Gemert et al. (2011)   | None | Campaign objective: Raise awareness of the harms and costs associated with risky drinking among young Australians, and to deliver personally relevant messages to encourage, motivate and support the primary target groups to modify their behaviour |
| Cross-sectional            | Campaign location and reach | Media channel(s): A range of mass media strategies and outlets including television, cinema, radio, online advertising, brochures and out-of-home print advertisements such as free postcard advertising, washroom mirrors in nightclubs, street posters, stencil chalking and on street furniture |
|                            | Australia, national reach | |
|                            | Target population | Young people 15–25 years and their parents |
|                            | Comparison group | None |
| van Leeuwen (2013)         | None | Campaign objective: Favourably influence beliefs about the consequences of substance use, e.g. as being damaging to health, intentions, and behaviour concerning the use of substances |
| Cohort study               | Campaign location and reach | Media channel(s): National TV and online viewing via an emailed link |
|                            | Netherlands, national reach | |
|                            | Target population | Less educated adolescents (high school students receiving preparatory middle-level applied education) |
|                            | Comparison group | Participants who reported that they had seen one episode or less and did not complete any of the five surveys between pre- and post-test |
| Campbells targeting pregnant women or women of childbearing age | Campaign location and reach | Campaign objective: Urge women to not drink alcohol if they are pregnant and to avoid alcohol if they could become pregnant in order to reduce risks |
| Awopetu et al. (2008)      | None | Media channel(s): Billboard posters along transit routes, interiors of subway trains and city buses, local newspapers, radio public service announcements, printed materials (counter top inserts and brochures) |
| Historically controlled    | Unknown reach as messages were communicated along major transit routes | |
|                            | Target population | Women of childbearing age |
|                            | Comparison group | None but the authors narratively compared the outcome to that achieved in a historic period |
Beliefs and attitudes

Five studies measured alcohol-related beliefs or attitudes, some observing changes in the desired direction. Two of the campaigns aimed to change beliefs or attitudes (Barber and Grichting, 1990; Casswell et al., 1990), two aimed to reduce consumption (Wallack and Barrows, 1982; Barber et al., 1989) and one aimed to promote treatment seeking and improve knowledge (Plant et al., 1979). A national campaign targeting a range of drugs reported a statistically significant increase in support for higher tax on alcohol and for banning alcohol in public places (moderate quality) (Barber and Grichting, 1990). However, there was no significant change pre- and post-campaign in the proportions who consider alcohol to be a drug, the perceived danger associated with alcohol or in support for a range of other policies aimed at limiting consumption. A study (moderate quality) of a campaign involving television, radio, billboard displays and bus cards reported that respondents remained consistent over time in their concern about how much alcohol they consume and the possible negative effects (Wallack and Barrows, 1982). Other findings were from studies of weak quality and produced mixed findings on a number of beliefs and attitudes (Plant et al., 1979; Barber et al., 1989; Casswell et al., 1990).

Knowledge

Eight studies reported the impact of mass media campaigns on alcohol-related knowledge, with evidence that knowledge can be increased. Seven of the campaigns aimed to promote knowledge (Plant et al., 1979; Wallack and Barrows, 1982; Casiro et al., 1994; Gronbæk et al., 2001; Lowe et al., 2010; Hanson et al., 2012; Dixon et al., 2015) while one aimed to reduce consumption (Kelley et al., 2000). Of two studies of moderate quality, one found a significant improvement in knowledge of the risks of alcohol use during pregnancy in an exposed group compared to a control group (Lowe et al., 2010). The other study described no changes in knowledge in youth and adult samples during a campaign, but participants were already well informed at baseline; nevertheless slightly more than 20% of youth indicated they had received new information as a result of the campaign (Wallack and Barrows, 1982). The remaining six studies were of weak quality. One found a significant improvement in knowledge that drinking alcohol on a regular basis increases cancer risk and of the recommended number of standard drinks for low-risk in the long-term (Dixon et al., 2015). A repeated annual campaign reported an immediate increase in knowledge of unit guidelines after each campaign with a steady increase over time (Gronbæk et al., 2001). One study reported a significantly higher proportion of respondents after the campaign knew that alcohol will reach the baby in a pregnant woman, and that drinking alcohol during pregnancy could cause mental, physical and behavioural abnormalities in the baby. There was also a significant increase in knowledge of risk to the baby of drinking...
Table 2. EPID quality assessment ratings

| Study | Global rating | Selection bias | Study design | Confounders | Blinding | Data collection methods | Withdrawals and dropouts |
|-------|---------------|----------------|--------------|-------------|----------|-------------------------|-------------------------|
| Allamani et al. (2000) | Weak | Weak | Moderate | Moderate | Weak | Weak | Moderate |
| Allman et al. (2003) | Moderate | Weak | Weak | Weak | Weak | Weak | Moderate |
| Atkinson et al. (2011) | Weak | Weak | Weak | Weak | Weak | Weak | Moderate |
| Awopetu et al. (2008) | Moderate | Weak | Weak | Weak | Weak | Weak | Moderate |
| Barber et al. (1989) | Weak | Weak | Weak | Weak | Weak | Weak | Moderate |
| Barber (1990) | Weak | Weak | Weak | Weak | Weak | Weak | Moderate |
| Casiro et al. (1994) | Weak | Weak | Weak | Weak | Weak | Weak | Moderate |
| Casswell et al. (1990) | Weak | Weak | Weak | Weak | Weak | Weak | Moderate |
| Dixon et al. (2015) | Weak | Weak | Weak | Weak | Weak | Weak | Moderate |
| Flynn et al. (2006) | Weak | Weak | Weak | Weak | Weak | Weak | Moderate |
| Grønbæk et al. (2001) | Weak | Weak | Weak | Weak | Weak | Weak | Moderate |
| Hanson et al. (2012) | Weak | Weak | Weak | Weak | Weak | Weak | Moderate |
| Kaariainen et al. (2008) | Weak | Weak | Weak | Weak | Weak | Weak | Moderate |
| Karlsson et al. (2005) | Weak | Weak | Weak | Weak | Weak | Weak | Moderate |
| Kelley et al. (2000) | Weak | Weak | Weak | Weak | Weak | Weak | Moderate |
| Kypri et al. (2005) | Weak | Weak | Weak | Weak | Weak | Weak | Moderate |
| Lowe et al. (2010) | Weak | Weak | Weak | Weak | Weak | Weak | Moderate |
| Plant et al. (1979) | Weak | Weak | Weak | Weak | Weak | Weak | Moderate |
| Scheier (2010) | Weak | Weak | Weak | Weak | Weak | Weak | Moderate |
| Siriwardhana et al. (2013) | Weak | Weak | Weak | Weak | Weak | Weak | Moderate |
| Surkan et al. (2003) | Weak | Weak | Weak | Weak | Weak | Weak | Moderate |
| Trees (2015) | Weak | Weak | Weak | Weak | Weak | Weak | Moderate |
| van Gemert et al. (2011) | Weak | Weak | Weak | Weak | Weak | Weak | Moderate |
| van Leeuwen (2013) | Weak | Weak | Weak | Weak | Weak | Weak | Moderate |
| Wallack (1982) | Weak | Weak | Weak | Weak | Weak | Weak | Moderate |
| Study                        | EPHPP global rating | Health and social outcomes | Health promotion outcomes | Exposure outcomes |
|-----------------------------|---------------------|---------------------------|--------------------------|-------------------|
| **Campaigns targeting general adult populations** |                     |                           |                          |                   |
| Allamani et al. (2000)      | Weak quality        |                           | Information seeking      | Onward transmission/discussion |
| Barber et al. (1989)        | Weak quality        | ▲ Alcohol consumption     | ▼ Beliefs                | △ Recall of campaign and messages |
| Barber (1990)               | Moderate quality    | ● Alcohol consumption     | ▲ Beliefs                | △ Recall of campaign and messages |
| Casswell et al. (1990)      | Weak quality        | ■                          | ▲ Attitudes              | △ Exposure          |
| Dixon et al. (2015)         | Weak quality        | ● Alcohol consumption     | ▲ Beliefs                | △ Unprompted recall of campaign |
| Gronbaek et al. (2001)      | Weak quality        | ▲ Information seeking     | ▲ Knowledge              | △ Recall of campaign and messages |
| Kaariainen et al. (2008)    | Weak quality        | ■                          | ▲ Knowledge              | △ Recall of messages |
| Karlsson et al. (2005)      | Weak quality        | ● Alcohol consumption     |                          | △ Recall of messages |
| Plant et al. (1979)         | Weak quality        | ▼▼ Alcohol consumption   | △ Beliefs                | △ Exposure          |
| Siriwardhana et al. (2013)  | Weak quality        | ■                          | △ Knowledge              | △ Recall of messages |
| Wallack (1982)              | Moderate quality    | ● Alcohol consumption     | Intention                | △ Understanding    |
|                             |                     |                           | Knowledge                | △ Prompted recall of messages |
|                             |                     |                           | Attitudes                | △ Awareness        |
|                             |                     |                           |                          | △ Discussion of topic with others |
| **Campaigns targeting young people and/or their parents** |                     |                           |                          |                   |
| Atkinson et al. (2011)      | Weak quality        | ■                          |                          | △ Interaction       |
| Flynn et al. (2006)         | Strong quality      | ● Alcohol consumption     | Norms                    | △ Exposure to alcohol prevention messages via media channels used in the campaign |
|                             |                     |                           | Self-efficacy            | △ Identification   |
|                             |                     |                           |                          | △ Attitudinal responses |
|                             |                     |                           |                          | △ Attitudinal responses |
|                             |                     |                           |                          | △ Prompted recall of messages |
| Study                  | EPHPP global rating | Health and social outcomes | Health promotion outcomes | Exposure outcomes |
|-----------------------|---------------------|----------------------------|---------------------------|-------------------|
| Kelley et al. (2000)  | Weak quality        | ▲                           | △ Self-efficacy           | △ Onward transmission/discussion |
|                       |                     | △ Awareness of changes in community environment for alcohol | Knowledge         | ▲ Recall          |
| Kypri et al. (2005)   | Moderate quality    | △ Alcohol consumption (unsupervised drinking) | △ Onward transmission/discussion |
|                       |                     | ▽ Alcohol consumption (binge drinking) | ▲ Recall |          |
| Scheier (2010)        | Strong quality      | ▼ Alcohol consumption       | △ Onward transmission/discussion |
|                       |                     | ▽ Alcohol consumption       | ▲ Recall |          |
| Surkan et al. (2003)  | Weak quality        | ▼ Alcohol consumption       | △ Onward transmission/discussion |
|                       |                     | ▽ Alcohol consumption       | ▲ Recall |          |
| Trees (2015)          | Weak quality        | ▼ Alcohol consumption       | △ Onward transmission/discussion |
|                       |                     | ▽ Alcohol consumption       | ▲ Recall |          |
| van Gemert et al. (2011) | Weak quality     | ▼ Alcohol consumption       | △ Onward transmission/discussion |
| van Leeuwen (2013)    | Weak quality        | ▼ Alcohol consumption       | △ Onward transmission/discussion |
|                       |                     | ▽ Alcohol consumption       | ▲ Recall |          |
|                       |                     | ▽ Alcohol consumption       | ▲ Recall |          |
| Campaigns targeting pregnant women or women of childbearing age |
| Awopetu et al. (2008) | Weak quality        | ▼ Alcohol consumption       | △ Onward transmission/discussion |
|                       |                     | ▼ Alcohol consumption       | ▲ Recall |          |
| Casiro et al. (1994)  | Weak quality        | ▲ Information seeking        | ▲ Awareness of information via media channel used in campaign |
| Hansson et al. (2012) | Weak quality        | ▲ Knowledge                  | ▲ Identification         |
| Lowe et al. (2010)    | Moderate quality    | ▲ Knowledge                  | ▲ Onward transmission/discussion |

▲ Positive results, statistically significant (positive/negative in public health terms e.g. positive=decrease in alcohol consumption or increase in campaign awareness).
△ Positive results, not statistically significant or significance unclear.
▽ Negative results, statistically significant.
∇ Negative results, not statistically significant or significance unclear.
▼, ▽, △, ▲ Results open to interpretation (e.g. single group cross-sectional).
●, ○ Evidence of no effect.
■, ■, ▼, ▽, △, ▲ No evidence.
small amounts of alcohol (drinking once a week or once a month) but
not of more regular drinking (once a day). Knowledge levels did not
significantly change on other statements (Casiro et al., 1994). One
study found high proportions of participants agreed the campaign
increased their knowledge on foetal alcohol syndrome and on the
effect of alcohol consumption during pregnancy (Hanson et al.,
2012). One study reported a significant increase in how much had
been learned from the media about the dangers of alcohol use (Kelley
et al., 2000). Finally, those who reported being exposed to a cam-
paign demonstrated slightly improved ability to name people or agen-
cies offering help to problem drinkers and to name symptoms of
alcoholism (Plant et al., 1979).

Other social cognitive outcomes
Two studies reported self-efficacy to reduce or stop the consump-
tion of alcohol; one found no effect on self-efficacy (strong quality)
(Flynn et al., 2006) and the other found that increases in self-
efficacy year-on-year were either statistically significant or of border-
line significance (weak quality) (Kypri et al., 2000). A single study
reporting perceived social norms found that viewing the campaign
was associated with an increase in perceived social pressure to limit
consumption (weak quality) (van Leeuwen et al., 2013).

Exposure outcomes
Interaction, discussion or onward transmission
Evidence that campaigns promoted interaction or discussion about
alcohol was mixed and mostly weak. More individuals exposed to a
campaign had talked to friends about alcohol use during pregnancy
compared to controls. The difference was of borderline significance
and the campaign aimed to promote interpersonal discussion about the
topic (moderate quality) (Lowe et al., 2010). A campaign which had
an objective of reducing parental supply of alcohol to adolescents
reported that 28% of parents in the media areas said they discussed
issues surrounding unsupervised drinking more with their teenager
during the campaign than before it commenced, of whom 76% attributed
this to the campaign, while 20% said they discussed unsupervised
drinking more frequently with other adults (moderate quality) (Kypri
et al., 2005). Three other studies were of weak quality and their
designs did not allow assessment of causal associations (Surkan et al.,
2003; Atkinson et al., 2011; Siriwardhana et al., 2013).

Recall
Seventeen studies reported participant recall, recognition or aware-
ness of mass media campaigns (2 strong quality, 3 moderate and
12 weak) (Plant et al., 1979; Wallack and Barrows, 1982; Barber
et al., 1989; Casiro et al., 1994; Allamani et al., 2000; Grønbæk
et al., 2003; Surkan et al., 2003; Karlsson et al., 2005; Kypri et al.,
2005; Flynn et al., 2006; Kaarinen et al., 2008; Lowe et al., 2010;
Scheir and Grenard, 2010; van Gemert et al., 2011; Siriwardhana
et al., 2013; Dixon et al., 2015; Trees, 2015). One study compared
unprompted recall in an exposed and a non-exposed group, finding
levels of recall in the groups were 65 and 9%, respectively (Barber
et al., 1989). Based on 12 of the 17 studies, unprompted recall in
exposed groups ranged from 5.7% in a local bus poster campaign
(Allamani et al., 2000) to 80% in a repeated national campaign
(Grønbæk et al., 2001). Four studies measured prompted recall of
campaigns or campaign messages. The first study found 76% of the
exposed group and 39% of the non-exposed group said they had
seen at least one of the campaign advertisements (Wallack and
Barrows, 1982). The proportion that had seen or heard at least one
of the campaign messages was 81.3% in the second study (Flynn
et al., 2006). The third study found significantly more campaign items
were reported as seen by an exposed group than a control group
(Kypri et al., 2005) and the fourth study found 81.2% recalled the
campaign advertisement after being shown it (Dixon et al., 2015).
Unprompted recall of campaign messages ranged from 12 to 96% based
on six studies (Plant et al., 1979; Barber et al., 1989; Surkan
et al., 2003; van Gemert et al., 2011; Dixon et al., 2015; Trees, 2015).

Attitudinal/emotional responses
Six studies recorded attitudinal or emotional responses to mass med-
ia campaigns with generally positive results. For example, in a study of
strong quality the proportions who liked the messages, of those who
had seen or heard them, were 70 and 75%, respectively, for TV and radio
(Flynn et al., 2006). The proportion who thought a national campaign
was a good or very good initiative was ~90% (weak quality) (Grønbæk
et al., 2001).

Campaigns targeting specific population groups
Eleven campaigns targeted general adult populations, three of which
targeted men (Casswell et al., 1990; Karlsson et al., 2005; Siriwardhana
et al., 2013) and one targeted women (Dixon et al., 2015) (Table 1).
Studies (mostly weak quality) suggest such adult-targeted campaigns
can be recalled by the target audience and can achieve changes in knowl-
edge, attitudes and beliefs about alcohol, but there is a lack of
evidence that they can impact alcohol consumption. Nine campaigns
targeted alcohol consumption in young people (Kelley et al., 2000;
Surkan et al., 2003; Kypri et al., 2005; Flynn et al., 2006; Scheir and
Grenard, 2010; Atkinson et al., 2011; van Gemert et al., 2011; van
Leeuwen et al., 2013; Trees, 2015) (Table 1). They utilized different
strategies and provided mixed findings, some of which indicated they
were effective in reaching their target audience and achieving their
objectives but several of the studies were of very weak design. Four
campaigns aimed to reduce alcohol consumption in pregnancy (Cassio,
1994; Awopetu et al., 2008; Lowe et al., 2010; Hanson et al.,
2012). As with those targeting general adult populations, they provide
evidence that they can be effective at improving knowledge and aware-
ness in the target audience but the quality of the evidence is low.

DISCUSSION
The evidence suggests mass media health campaigns about alcohol
can be recalled by individuals and can achieve changes in knowl-
edge, attitudes and beliefs about alcohol, based mainly on weak
quality studies. Findings of studies that measured alcohol consump-
tion suggest campaigns have not reduced consumption, although
most did not state that they directly aim to do so.

The finding that campaigns can be recalled suggests appropriate
media channels, targeting strategies, durations and intensities have
been utilized to reach target audiences. These campaign characte-
ristics were not always reported by studies so it is not possible to draw
a link between types of campaign strategies and levels of recall or
exposure. Recall of tobacco mass media campaigns has been shown
to be positively associated with smoking cessation (Jepson et al.,
2007) so the outcome may be an important first step towards subse-
quent behaviour change in populations.

Most campaigns that aimed to improve knowledge were shown
to be effective. This was particularly evident in areas where knowl-
edge was initially low, for example, knowledge of unit consumption
guidelines and of the link between alcohol and cancer. Mass media can yield sustained knowledge, which may lay the groundwork for reductions in consumption that are achieved using other public health measures.

There was evidence of increases in information seeking and treatment seeking. However, alcohol campaigns have not presented the simple call to action of tobacco messages (‘quit’) or provided offers of tangible help such as ‘quitlines’. Furthermore, as alcohol support services have historically been aimed at very heavy drinkers there may be a perception that current services do not cater for those who drink less. Mass media might therefore have limited utility in promoting service uptake.

Most studies found no impact on alcohol consumption, consistent with the conclusion of a previous review that there should be modest expectations of behaviour change from such campaigns (Snyder et al., 2004). Longer term evaluations conducted following sustained and repeated exposure to campaigns might be expected to be better able to detect effects on behaviour. However, the relationship between tobacco mass media campaign duration and effectiveness has been difficult to gauge due to confounding influences and trends over time (Durkin et al., 2012). The context in which alcohol health promotion campaigns operate is particularly challenging because of the ubiquity and power of alcohol marketing (de Bruijn et al., 2016) and pro-alcohol cultural norms (Gordon et al., 2012). This is another key difference to tobacco, where health campaigns in recent years have run in a context where most tobacco marketing has been banned or strictly regulated and social norms have become increasingly anti-smoking. The current review found evidence of impact on short term intermediate outcomes, suggesting mass media can play a supportive role for other actions which are more likely to have an impact on behaviour. These might include price-based measures (Babor et al., 2010), advertising restrictions (Siegrfried et al., 2014), limiting availability and access to alcohol (Anderson et al., 2009) with the targeting of high risk groups (Foxcroft et al., 2015).

This review has the following strengths and limitations. It is the first comprehensive systematic review of evidence of the effectiveness of mass media to reduce alcohol consumption, allowing those who make decisions about whether and how to develop and implement such campaigns to do so informed by a synthesis of the evidence base. A strength of the review lies in the common features shared by all the included mass media campaigns as a result of focused inclusion criteria, such as incidental exposure and the absence of person-to-person contact. In addition to exploring effects of campaigns by outcome, the presentation of findings by common target population (general adults/young people/pregnant women) further strengthens the ability of the review to guide policy and practice. The review has also identified gaps in knowledge for further research. The quality of studies included in the review was generally weak, most outcomes were self-reported and evidence in high risk sub-groups was not reported consistently enough to be synthesized in the review. There is a need for evaluations of higher quality that demonstrate valid and reliable measurement of outcomes, adopt a cluster-randomized or robust natural experiment design where feasible and identify effects in high risk sub-groups. Aims of campaigns were extracted from included reports and were often limited in detail. For a better assessment of whether mass media campaigns achieve their aims, pre-campaign documents should be sought that set out a priori aims, against which study findings can be assessed, although such documents are unlikely to be available to researchers. The findings have limited generalizability beyond developed countries. The inclusion only of studies published in English and indexed in electronic databases may have introduced language and publication bias.

Some older campaigns were conducted in a different media landscape to the current digital and online environment. However, the evidence was predominantly from campaigns involving TV and radio which are media channels that still have important influence today.

There are barriers to the conduct of evaluations of population-level interventions to the standards required to achieve a ‘strong’ quality rating. For example, it is usually not appropriate or feasible to conduct randomized controlled evaluations of such interventions. Similarly, high study response rates can be difficult to achieve in large-scale studies. When assessing participant attrition the tool does not take into account the length of follow-up, which could bias against longer term follow-ups. However, the EPHPP quality assessment tool allowed important core domains to be assessed and the quality of the evidence to be compared with other public health interventions. The use of the EPHPP tool within this review allowed studies of all designs and appropriate study domains to be assessed.

The review identified only 24 mass media alcohol campaigns, using searches without a time restriction, compared to 72 English-language alcohol harm reduction campaigns produced between 2006 and 2014 identified by a content analysis study (Dunstone et al., 2017). Our synthesis of the evidence includes only the minority of campaigns that have been both evaluated and published. To address the challenges in evaluating mass media alcohol campaigns, more studies are required of larger campaigns exploiting indirect as well as direct pathways to behaviour change. Campaign cost-effectiveness should also be assessed to establish whether any health benefits observed are sufficient to justify the substantial expenditure involved in campaign development and broadcast.

CONCLUSION

Mass media health campaigns about alcohol are often recalled by individuals, have achieved changes in knowledge, attitudes and beliefs about alcohol but there is little evidence of impact on alcohol consumption. Such interventions may have a longer term role as part of a comprehensive harm reduction strategy, by improving knowledge in areas where it is low, potentially contributing to changing harmful drinking norms and helping to set the agenda for alcohol policy change.

SUPPLEMENTARY MATERIAL

Supplementary data are available at Alcohol and Alcoholism online.

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Authors’ Contribution

B.Y.: study protocol, searches, data screening, collection, synthesis and interpretation, quality assessment, writing and revising the article, S.L.: study protocol, screening, data collection, data quality checking, study quality assessment, data synthesis and interpretation, overseeing and managing the review process, preparation of the article and revising the final article, S.V.K.: study protocol, data interpretation, revising the final article, L.B.: obtaining funding, formulating the project plan, reviewing progress of the study, M.S.: contributing to study design, reviewing progress of the study, K.A., contributing to the study design, revising the final article, M.C. and S.H.: contributing to study design, J.T. and K.H.: study protocol, preparing the data extraction database, providing methodological advice, A.A.: data screening, collection and quality assessment, T.L.: study protocol, screening, data collection, data quality checking, study quality assessment, data synthesis and interpretation, overseeing and managing the review process, preparation of the article and revising the final article. All authors approved the final version of the article.

Conflict of Interest Statement

None declared.

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