

Industry self-regulation of alcohol marketing: a systematic review of content and exposure research

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ABSTRACT

Background and Aims With governments relying increasingly upon the alcohol industry's self-regulated marketing codes to restrict alcohol marketing activity, there is a need to summarize the findings of research relevant to alcohol marketing controls. This paper provides a systematic review of studies investigating the content of, and exposure to, alcohol marketing in relation to self-regulated guidelines. **Methods** Peer-reviewed papers were identified through four literature search engines: SCOPUS, Web of Science, PubMed and PsychINFO. Non-peer-reviewed reports produced by public health agencies, alcohol research centers, non-governmental organizations and government research centers were also identified. Ninety-six publications met the inclusion criteria. **Results** Of the 19 studies evaluating a specific marketing code and 25 content analysis studies reviewed, all detected content that could be considered potentially harmful to children and adolescents, including themes that appeal strongly to young men. Of the 57 studies of alcohol advertising exposure, high levels of youth exposure and high awareness of alcohol advertising were found for television, radio, print, digital and outdoor advertisements. Youth exposure to alcohol advertising has increased over time, even as greater compliance with exposure thresholds has been documented. **Conclusions** Violations of the content guidelines within self-regulated alcohol marketing codes are highly prevalent in certain media. Exposure to alcohol marketing, particularly among youth, is also prevalent. Taken together, the findings suggest that the current self-regulatory systems that govern alcohol marketing practices are not meeting their intended goal of protecting vulnerable populations.

Keywords Adolescent, advertising, alcohol, industry, marketing, self-regulation.

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INTRODUCTION

Short-term exposure of young people to alcohol advertising is associated with positive thoughts about alcohol and greater alcohol consumption [1,2]. Longitudinal studies of alcohol advertising have demonstrated a positive relationship between advertising exposure and alcohol consumption [3] and, among youth, research shows that each additional advertisement exposure per 4-week period can increase alcoholic drinks consumption by 1% [4].

According to a global survey of national health authorities, between 8 and 56% of countries have alcohol marketing regulations to protect youth and other vulnerable populations from the harmful effects of alcohol marketing [5]. These codes are either statutory or voluntary and can contain guidelines on the content and placement of advertisements, as well as other marketing materials.

For example, the Loi Évin, enacted in France, restricts alcohol marketers to using only the name of the alcohol producer, the brand name of the product and related product characteristics, whereas the Advertising Act of Ukraine states that alcohol advertisements may be broadcast on radio or television only from 11:00 p.m. to 6:00 a.m. [6,7]. Alcohol advertising bans have been enacted in many countries, including Denmark, Finland, Sri Lanka and Turkey, although bans in Denmark and Finland were overturned due to incompatibility with European Union regulations [8].

Voluntary, self-regulated advertising codes have been created by several kinds of organizations. For example, professional advertising organizations often use standards of practice that prohibit false or misleading statements, testimonials that do not reflect real-world opinions, misleading price information, claims unsupported by science and

statements and suggestions or images that would be considered offensive to public decency [9].

Alcohol producers may also follow alcohol-specific advertising codes. In Australia, the Alcohol Beverages Advertising Code (ABAC) contains recommendations concerning product naming and packaging, and the content of print, billboard, internet, cinema, television, producer point-of-sale and radio advertisements [10]. The Outdoor Media Association of Australia and Free TV Australia govern advertisement placement [11,12]. Ghana, Ireland, Japan, New Zealand, South Africa and the United Kingdom use similar alcohol advertising codes that were developed by alcohol industry-sponsored corporate social responsibility organizations [13–15]. In the United States, alcohol advertising codes are largely product-specific, with companies that principally produce beer, wine and distilled spirits agreeing to follow unique codes [16–18]. The industry-funded International Alliance for Responsible Drinking (IARD), formerly the International Center for Alcohol Policies, has also created the *Guiding Principles for Self-Regulation of Marketing Communications for Beverage Alcohol*, which are intended to apply to all forms of alcohol marketing [19]. Moreover, major alcohol producers, including Anheuser-Busch InBev (A-B InBev), SABMiller, Diageo and Heineken, have created internal advertising codes [20–23]. Supplementary internal codes include A-B InBev's College Marketing Code and Diageo's code for digital content [24,25].

Voluntary, self-regulated alcohol marketing codes contain exposure and content guidelines. Exposure guidelines typically specify that no alcohol advertisement should be broadcast or displayed to an audience where the percentage of underage individuals exceeds 30%, although lower thresholds also exist [19,26]. Content-related guidelines within advertising codes generally focus upon five major themes: responsible marketing communications, responsible alcohol consumption, health and safety aspects, protection of minors and the effects of alcohol [19].

The purpose of this paper is to review relevant research, published in peer-reviewed journals and non-peer-reviewed sources, on the content of alcohol advertising, exposure to alcohol advertising and adherence to advertising codes. Section one focuses on the content of alcohol advertising and answers the following questions: (1) do current self-regulatory marketing codes prevent the dissemination of content that violates code guidelines, and (2) regardless of marketing codes, is the content within alcohol marketing potentially harmful to young people? Section two focuses on exposure to alcohol marketing and answers the following questions: (1) how is alcohol advertising exposure measured and studied, and (2) to what extent is alcohol advertising on television, in magazines and newspapers, on radio, in public locations and in digital media accessible to youth and other

vulnerable populations? Section three focuses on methodological issues and answers the question: has alcohol advertising been evaluated using sufficiently rigorous methods to make general statements on the effectiveness of self-regulation?

METHODS

SCOPUS, Web of Science (WOS), PubMed and PsychINFO were searched. The search terms 'alcohol AND (advertising OR marketing) AND (regulat* OR content)' were used to locate papers on alcohol advertisement content. The search terms 'alcohol AND (advertising OR marketing) AND (regulat* OR exposure)' were used to locate papers on alcohol advertisement exposure. There were no date restrictions because no previous reviews were identified on this topic. Paper reference lists were reviewed to identify additional papers that were not in the search results. Studies were selected if they contained information on (1) the effectiveness of the content guidelines within alcohol advertising codes, (2) the content of alcohol advertisements, (3) methods of measuring exposure to alcohol marketing, (4) the effectiveness of the exposure guidelines within alcohol advertising codes or (5) the extent of alcohol marketing exposure to youth, young adults or adults. Studies were excluded if they were published in a non-English journal or were an editorial, opinion or review paper. Non-peer-reviewed reports produced by public health agencies, alcohol research centers, non-governmental organizations, government research centers and national industry advertising associations were also searched using the same criteria. Non-peer-reviewed reports were collected from: Alcohol Action Ireland, Alcohol Concern, Alcohol Justice/Marin Institute, the Alcohol Marketing Monitoring in Europe project (AMMIE), the Association to Reduce Alcohol Promotion in Ontario (ARAPO), the Center on Alcohol Marketing on Youth (CAMY), the European Centre for Monitoring Alcohol Marketing (EUCAM), the US Federal Trade Commission (FTC), the Monitoring Alcohol Marketing in Africa project (MAMPA), the National Youth Council of Ireland (NYCI), Ofcom, the Public Health Foundation of India (PHFI) and RAND Europe. Information was abstracted by a doctoral candidate (J.N.) and verified by the project supervisor (T.B.).

Research methodology for each publication was rated using questions derived from the Transparent Reporting of Evaluations with Nonrandomized Designs (TREND) statement [27], the Meta-analysis of Observational Studies in Epidemiology (MOOSE) checklist for meta-analyses [28] and the guidelines developed by the Grading of Recommendations, Assessment, Development and Evaluations (GRADE) working group [29]. Thirteen questions were adapted to evaluate research on alcohol advertising content (Supporting information, Appendix S1). Seven

questions were used to evaluate research on alcohol advertising exposure. The sum of positive responses for each publication was calculated. For content and exposure studies, values could range from 0 to 13 and 0 to 7, respectively. Each publication was rated by two master's-level public health professionals. Inter-rater reliability was high for content [intra-class correlation (ICC), 95% confidence interval (CI) = 0.94 (0.88–0.97)] and exposure [ICC, 95% CI = 0.83 (0.71–0.90)] studies. Total scores were averaged across raters, and peer-reviewed papers and non-peer-reviewed reports were compared using the Mann–Whitney *U*-test.

RESULTS

For papers on advertisement content, SCOPUS, WOS, PubMed and PsychINFO returned 473, 497, 277, 344 papers, respectively. From the initial set of 1591 peer-reviewed papers, 484 duplicates were removed (Fig. 1). An additional 243 were removed because they were an editorial, opinion or review paper, 25 papers were removed for being published in a non-English journal and 814 papers were removed because they did not contain data on alcohol advertising content. From the remaining 25 peer-reviewed papers, five additional papers were identified

through paper reference lists. One paper in press at the time this manuscript was submitted was also included. Thirteen non-peer-reviewed reports also contained relevant information.

For papers on advertisement exposure, SCOPUS, WOS, PubMed and PsychINFO returned 291, 274, 257 and 482 papers, respectively. From the initial set of 1304 peer-reviewed papers, 89 duplicates were removed (Fig. 2). In addition, 213 papers were removed because they were an editorial, opinion or review paper, 18 papers were removed for being published in a non-English language journal and 946 papers were removed because they did not contain data on exposure to alcohol advertising. Among the 38 remaining papers, four additional peer-reviewed were identified through paper reference lists. Fifteen non-peer-reviewed reports also contained relevant information. In total, 96 publications on alcohol advertising are reviewed in this paper.

Alcohol advertising content

Studies of code violations

Table 1 summarizes 19 studies conducted in 19 countries where advertising content was evaluated in terms of code

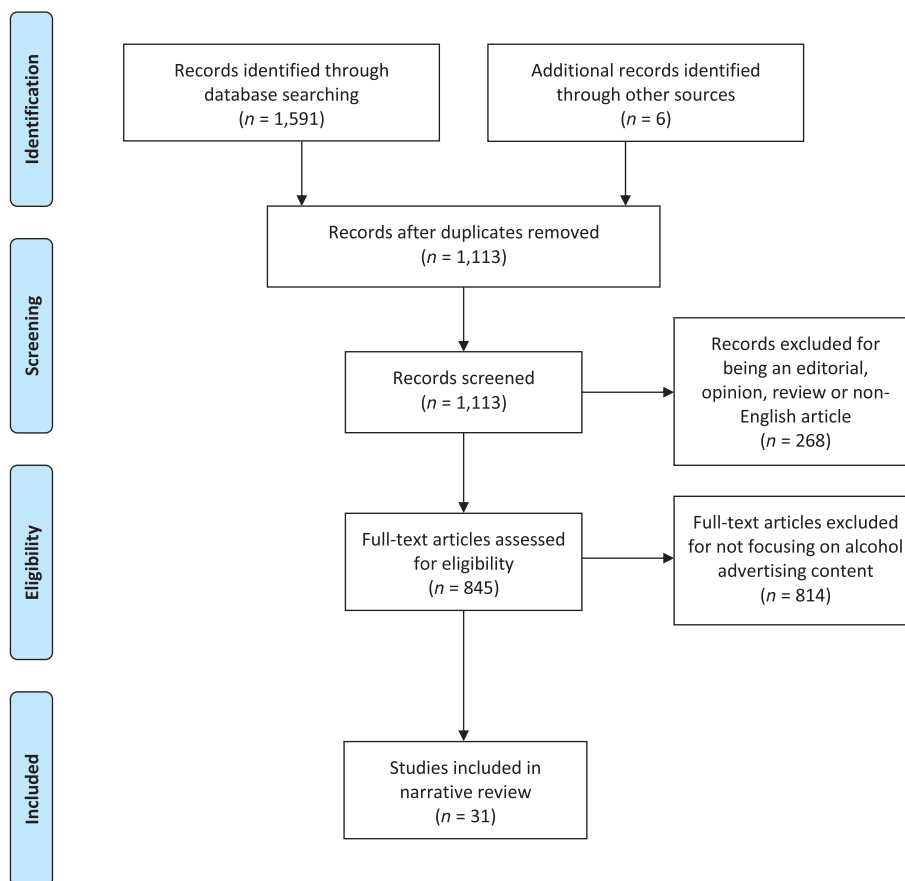


Figure 1 Peer-reviewed paper selection flow-chart for alcohol advertisement content peer-reviewed papers

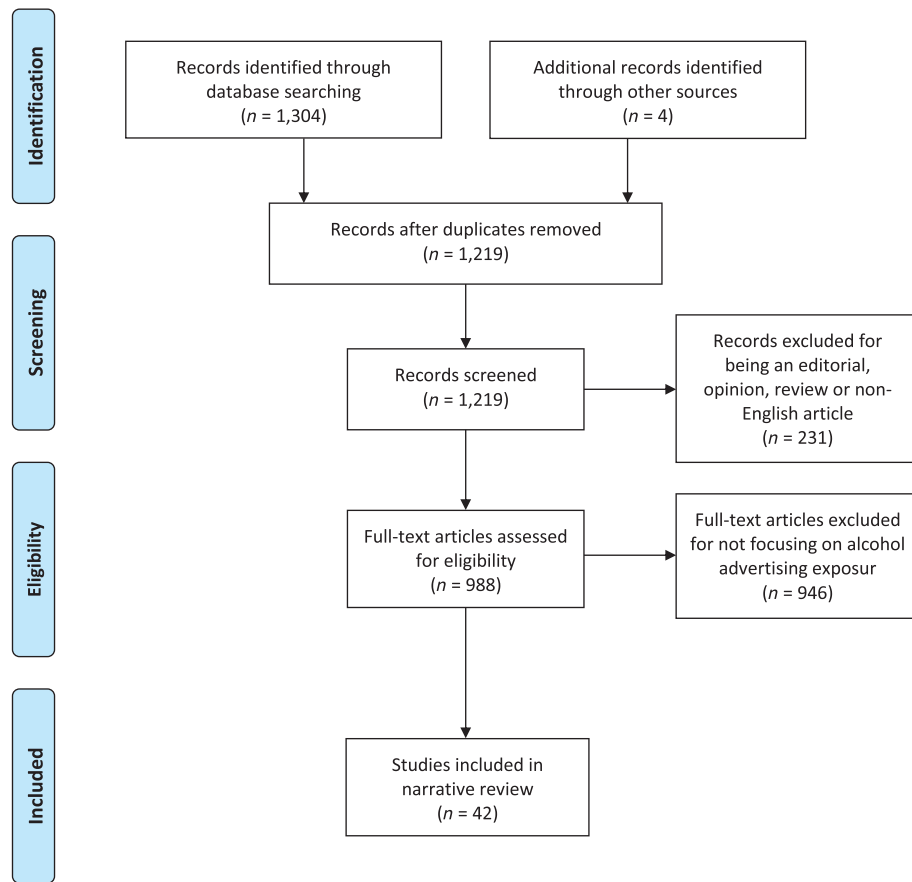


Figure 2 Peer-reviewed paper selection flow-chart for alcohol exposure peer-reviewed papers

violations [30–48]. All studies reported evidence of code violations. Among the 17 studies that calculated code violation rates, the sampling methodology partially dictated the range of code violation rates published. Five studies used pre-selected advertisements that were thought to contain code violations and reported violation rates of 100% [30–34]. The remaining 12 studies used either a random sample of advertisements or a total survey approach [35–48]. Among these studies, code violation rates for television and magazine advertisements ranged from 12.3 to 86% [34–36] and 0 to 52% [34,37–48], respectively. One study reported a code violation rate of 74.1% for digital content [42], and an additional study, whose unit of analysis was a marketing campaign, reported a code violation rate of 100% [43]. The most commonly violated guidelines included associations with social or sexual success and guidelines intended to protect youth.

Evaluations of thematic content

In some studies, a content analysis of alcohol advertisements was performed without reference to an advertising code. Nevertheless, these studies are often relevant to the question of whether the content of alcohol advertising may be harmful to youth. Table 2 summarizes

information abstracted from 25 studies conducted in 16 countries [49–73]. All studies identified content that may be appealing to youth.

In the 1990s and early 2000s, US magazine and television advertisements often used themes of humor, relaxation, friendship and masculinity [53,54]. Sex appeal was used predominantly when female actors appeared in the advertisements [54]. The non-profit organization Marin Institute (now Alcohol Justice) has noted an increased prevalence of health-related themes in alcohol advertising, including overt claims that product consumption is beneficial to health [55], and the health benefits of low-carbohydrate beer were promoted to attract health-conscious drinkers in Canada [56].

Outdoor alcohol advertising near schools may use youth-oriented content, including cartoons and animals [58], and an evaluation of alcohol advertising in Ireland found that 62% of advertisements were appealing to teens, with descriptors such as ‘funny’, ‘clever’, ‘cheap’ and ‘attractive’ often used [59]. Youth appeal has also been documented in advertisements collected in Denmark, the Netherlands, Germany and Italy [60–63].

A study of Bulgarian advertisements found that they primarily use overt sexual themes and associations with sporting events [64]. Similar reports have emerged from

Table 1 Summary of papers and reports related to the self-regulation of alcohol advertising content codes.

<i>Authors/organization (year of publication)</i>	<i>Country</i>	<i>Medium</i>	<i>Code</i>	<i>% Violations</i>	<i>Prevalent content/other findings</i>	<i>Total methods criteria met</i>
Saunders <i>et al.</i> (1991) ^a	Australia	Television, magazine, newspapers	ABAC	100%	Suggestive of social success, relaxation, sporting achievement	6
Jones <i>et al.</i> (2002) ^a	Australia	Television, magazines	ABAC	77.8–100%	Associates alcohol with altered moods, sex, and discrimination	4
Donovan <i>et al.</i> (2007) ^a	Australia	Magazine	ABAC	52%	Advertisements had a strong appeal to adolescents and promoted positive social, sexual and psychological expectancies	5
Jones <i>et al.</i> (2008) ^a	Australia	Television, magazines	ABAC	12.3% (TV) 4.2% (magazines)		7
Jones <i>et al.</i> (2010) ^a	Australia	Television	ABAC	46.2%	Use of celebrities, mascots, humor, social success	4
Jones <i>et al.</i> (2009) ^a	Australia	Television, magazine	ABAC		Subjects stated the products would help them have a good time, make them more sociable, and confident	9
Babor <i>et al.</i> (2008) ^a	US	Television, magazine	1997 US Beer Institute	60–100%	Different methods of calculating a violation alters the violation rate	10
Babor <i>et al.</i> (2013) ^a	US	Television	1997 & 2006 US Beer Institute	35–74%	Associated drinking with social success, content appealing to youth	7
Zwarun <i>et al.</i> (2005) ^a	US	Television	1997 US Beer Institute, DISCUS	Up to 75%	75% of alcohol advertisements violated the intended objective of alcohol depiction guidelines	6
Noel <i>et al.</i> (2016) ^a	Argentina, Brazil, Canada, Finland, France, Mexico, Spain, US	Television	ICAP's Guiding Principles	86.2%	11% of advertisements contained strategically ambiguous content regarding drinking before hazardous activities	9
Rhoades <i>et al.</i> (2013) ^a	US	Magazines	US Beer Institute, DISCUS	3.97% of unique advertisements, 4.13% of published advertisements	Guidelines on the effects of alcohol and health and safety violated most often No advertisements broadcast in countries with strictest marketing restrictions Associations with risk, sexism, and sexual activity	7
Smith <i>et al.</i> (2014) ^a	US	Magazines	US Beer Institute, DISCUS	2.1%	Implied illegal activity, degrading a gender or minority, appealing primarily to an underage audience, showing excessive alcohol consumption.	6

(Continues)

Table 1. (Continued)

<i>Authors/organization (year of publication)</i>	<i>Country</i>	<i>Medium</i>	<i>Code</i>	<i>% Violations</i>	<i>Prevalent content/other findings</i>	<i>Total methods criteria met</i>
Wolburg <i>et al.</i> (2009) ^a	US, Ukraine	Magazines	US Beer Institute, US Wine Institute, DISCUS, Ukrainian Advertising Act	0% of US advertisements, 33.3% of Ukraine advertisements	Explicit or implied social or sexual success	4
Vendrame <i>et al.</i> (2010) ^a	Brazil	Television	Conselho Nacional deAuto-regulamentação Publicitária	100%	All advertisements that appealed to teenagers contained violations Increasing the appeal of alcohol use, children being targeted in the advertisement, and the product presented as appropriate for minors were more common violations	8
Vendrame <i>et al.</i> (2015) ^a	Brazil	Television	Conselho Nacional de Auto-regulamentação Publicitária	100%	At least 1 advertisements violated 11 of 17 guidelines within the code	7
Farrell <i>et al.</i> (2012) ^a	India, Malawi, Nigeria, Philippines, Sri Lanka, Thailand	Radio, outdoor & public	Portman Group	100%	Associations with strength and power, sexual success, social success and youth appeal	6
Winpenney <i>et al.</i> (2012) ^b	Germany, the Netherlands, UK	Television	Deutscher Werberat, STIVA, BCAP, Portman Group		Exact code violation rate not determined due to lack of specificity in the regulations Music, human characters, technological effects used to appeal to youth	8
Gordon (2011) ^a	UK	Digital	BCAP	74.1%	Use of competitions individuals could enter, interactive video games, sports, and music	6
Searle <i>et al.</i> (2014) ^a	UK	Television	BCAP	86%	Implications that alcohol contributes to popularity or has therapeutic qualities most common	8

^aPaper published in a peer-reviewed journal; ^bnon-peer-reviewed report.

Table 2. Summary of papers and reports related to the content analyses of alcohol advertising.

<i>Authors/organization (year of publication)</i>	<i>Country</i>	<i>Medium</i>	<i>Prevalent content/other findings</i>	<i>Total methods criteria met</i>
Strickland <i>et al.</i> (1982) ^a	US	Magazine	Quality, tradition, information, celebrities, and foreign settings	5
Finn <i>et al.</i> (1982) ^a	US	Television	Camaraderie, relaxation, humor, quality, physical activity, celebrities, hazardous activities	4
Pettigrew <i>et al.</i> (2012) ^a	Australia	Television	Humor, animals, sports, sex	8
Pinksey <i>et al.</i> (1999) ^a	Brazil	Television	Humor, relaxation, national symbolism, conformity	5
Beccaria (2001) ^a	Italy	Television	Advertising attempts to move alcohol use away from traditional alcohol use situations	4
Marin Institute (2011) ^b	US	Television, magazines, outdoor & public, digital	Women appear to be directly targeted	0
Kelly <i>et al.</i> (2000) ^a	US	Magazines	Increasing use of explicit and implied health themes, including the promotion of fortified products and weight loss claims	9
Cohen <i>et al.</i> (2011) ^a	US	Magazines	77.5% of beer advertisements depict life-style changes 28% of alcohol advertisements in African American newspapers contained human models, compared to 11% for general audience publications	5
Weintraub <i>et al.</i> (2005) ^a	US	Television, magazines	In magazines: factual information, humor, relaxation On television: relaxation, humor, friendship, masculinity	6
Slater <i>et al.</i> (1996) ^a	US	Television	Sex appeal was common when female characters used 39.4% of students reported that at least 1 advertisement shown contained an underage person drinking alcohol	8
Morgenstern <i>et al.</i> (2015) ^a	US	Television	42% of advertisements contained messages about partying 24% of advertisements used quality and 17% sports	6
Pasch <i>et al.</i> (2009) ^a	US	Outdoor & public	Culture, youth-oriented, cartoons, animals	9
Howard <i>et al.</i> (2004) ^a	US	Outdoor & public	6% of exterior alcohol advertisements targeted ethnic minorities using color or cultural symbols	8
National Youth Council of Ireland (2009) ^b	Ireland	Television, magazines, newspapers, radio, movies, outdoor & public	31% of interior alcohol advertisements targeted ethnic minorities 62% of all advertisements, 79% of distilled spirits advertisements, 75% of alcohol advertisements deemed appealing to youth	3
Alcohol Marketing: Monitoring in Europe (2010) ^b	Bulgaria	Television, outdoor & public, digital	Overt sexual themes and associations with sporting events more common	0
Alcohol Marketing: Monitoring in Europe (2010) ^b	Denmark	Magazines, newspapers, outdoor & public, digital	Children targeted using cartoons Females targeted through product glamorization Males targeted through sporting events and larger proportions	0

(Continues)

Table 2. (Continued)

<i>Authors/organization (year of publication)</i>	<i>Country</i>	<i>Medium</i>	<i>Prevalent content/other findings</i>	<i>Total methods criteria met</i>
Alcohol Marketing Monitoring in Europe (2010) ^b	Germany	Television, digital	Children targeted through interactive games and cartoon characters	2
Alcohol Marketing Monitoring in Europe (2010) ^b	Italy	Television, magazines, outdoor & public, digital	Distilled spirits promoted using humor and irony Beer promoted using sports	2
Alcohol Marketing Monitoring in Europe (2010) ^b	the Netherlands	Television	Youth targeted using cartoons and young models Humor, music, product information, life-style and sports	3
Association to Reduce Alcohol Promotion in Ontario (2004) ^b	Canada	Television, magazines	'Simulated lesbianism' used to attract males	0
de Bruijn (2011) ^b	The Gambia, Ghana, Nigeria, Uganda	Television, magazines, newspapers, radio, outdoor & public	Health benefits promoted to attract the health-conscious Athletic, social, and financial success Cartoons used to target children in Ghana Between 13 and 33 alcohol advertisements on Ugandan, Nigerian or Ghanaian television	3
Public Health Foundation of India (2013) ^b	India	Television, magazines, radio, outdoor & public, movies, digital	Between 5 and 101 alcohol advertisements on Ugandan, Nigerian, or Ghanaian radio Surrogate advertisements used to circumvent advertising bans Sexual success used to attract men	0
Nicholls (2012) ^a	UK	Digital	Social acceptance used to attract women	4
European Centre for Monitoring Alcohol Marketing (2009) ^b	World-wide	Digital	Social media posts included real-world tie-ins, quizzes, surveys, giveaways, competitions, sponsored shows, and new drink types Direct marketing to consumers occurs through social media outlets Websites contain tickets to concerts and sporting events, free music, free clothing	0
The Center on Alcohol Marketing and Youth (2004) ^b	US	Digital	Interactive content, video games, downloadable wallpapers, cartoon figures, downloadable screensavers common	2

^aPaper published in a peer-reviewed journal; ^bnon-peer-reviewed report.

Canada, where alcohol advertisements have used 'simulated lesbianism' in attempts to gain a greater share of the heterosexual male market [56].

In developing countries, such as Ghana, Nigeria and Uganda, alcohol advertisements used primarily athletic performance, social success and financial success [65]. Ghanaian advertisements were thought to target children by using cartoon characters, including an animated beer bottle. Surrogate advertising, whereby non-alcoholic products are labeled with alcohol brand names, is used in countries such as India, where alcohol advertising on television and radio is banned [66]. Advertisements contained either sexually explicit content to attract men or social acceptance content to attract women [66].

Alcohol-branded content on social media platforms, such as Facebook and Twitter, has been found to contain tie-ins to real-world events, quizzes, surveys, giveaways, competitions, sponsored shows and new types of drinks, with little to no mention of moderate or responsible drinking [67]. Alcohol brands also advertise directly to consumers through Instagram, Reddit and Flickr [66,68]. Alcohol-branded websites have been found to contain interactive content, video games, downloadable content, cartoon figures and information on sponsored events [69].

Alcohol advertising exposure

Exposure measurements

Several types of measurements have been used in research on alcohol advertising exposure. Impressions or impacts are defined as the number of times an individual or group has seen an advertisement [74,75]. Standardized measures [i.e. gross rating points (GRPs), targeted audience rating points (TARPS) or advertisement intensity] are derived from impressions or impacts. GRPs and TARPS are calculated by dividing the gross number of impressions an advertisement generates in the population segment of interest by the number of people in the population segment [74,76]. Advertisement intensity is defined as the total number of times an advertisement is viewed divided by the average number of viewers per time-period per month for a particular TV channel [77].

Individual exposure assessments were conducted most often using market research data, which can indicate media type, channel or publication and advertisement-specific viewership demographics [74]. Although some data were collected through automated processes, self-report was often used to indicate how many advertisements an individual had seen over a specified length of time [74,78]. In addition, some studies used school-based or population surveys to identify all alcohol advertisements viewed within a specified time window, with audience demographics measured at the same time or inferred later [79].

In the following sections, we describe the major foci of studies conducted on alcohol advertisement exposure within five media. The major findings of each study are reported in Table 3. Of the 57 studies conducted in 18 countries, 79% (45 studies) reported some amount of youth exposure to alcohol marketing.

Television

Twenty-eight studies on exposure to TV advertisements were conducted in the United States, Australia, the European Union (EU), Brazil and Zambia [45,52,74–76,78–100]. This research was focused on the exposure of underage youth to alcohol marketing, possible targeting of specific population segments, violations of the 30% rule and trends in code violation rates. Several studies conducted in the United States indicate that large numbers of underage youth have been exposed routinely to alcohol marketing. For example, in 2010, 23.7% of alcohol advertisements broadcast and 33.3% of alcohol impressions in 25 of the largest markets in the United States were placed in programming exceeding the industry's exposure threshold [79]. Although the FTC, using data supplied by the alcohol industry, reports high compliance with the exposure guidelines [82,83], studies have indicated that youth exposure to alcohol advertisements from television has been increasing over time [74]. Studies in Australia and the United Kingdom have reached similar conclusions [75,76]. High rates of alcohol advertising awareness among underage populations have been reported in Brazil, Scotland and Ireland [78,87–89].

Magazines and newspapers

Fifteen studies conducted in four countries evaluated the prevalence of youth exposure to alcohol advertisements in magazines and newspapers [40,73,77,82,94,101–107]. In Australia, 74.7% of 12–17-year-olds reported seeing at least one alcohol-branded magazine advertisement [101]. On a per-capita basis, US youths aged 12–20 were exposed to 48% more magazine beer advertisements, 20% more distilled spirits advertisements and 92% more alcohol advertisements than the 21 and older population during 2003 [94,103]. The FTC reports high compliance with the industry's exposure threshold [83]. Nevertheless, youth exposure to alcohol advertisements in magazines has increased over time [105].

Radio

Ten studies conducted in the United States investigated youth exposure to alcohol advertising through radio [82,83,94,101,108–110]. In 2004, 2006 and 2009, approximately 14, 8.1 and 9.2% of the advertisements were broadcast when the audience contained greater than 30% underage listeners, respectively [108–110]. Youth

Table 3 Compendium of studies devoted to the evaluation of youth exposure to alcohol advertising.

<i>Authors/organization (year of publication)</i>	<i>Country</i>	<i>Medium</i>	<i>Main findings</i>	<i>Methods criteria met</i>
The Center on Alcohol Marketing and Youth (2012) ^b	US	Television	2 664 919 alcohol advertisements on US TV from 2001–09 6.1–12.5% shown to audiences with greater than 30% youth Year-over-year growth of GRPs was faster for under 21 population than any other age group	2
Ross <i>et al.</i> (2013) ^a	US	Television	81 unique brands advertised after 9:00 p.m. in 2010	4
Ringel <i>et al.</i> (2006) ^a	US	Television	92% of alcohol advertisements were shown on cable networks in 2010 39% of advertisements in 2010 were shown during sports programming Male youth are more likely to be exposed than female youth	5
Jernigan <i>et al.</i> (2005) ^a	US	Television, magazine, radio, digital	From 2001 to 2003, 24% of advertisements were more likely to be seen by underage youth than legal adults on television per capita 12–20 years were exposed to 48% more beer, 20% more distilled spirits, and 92% more alcohol advertisements than the adult population in 2003 Youth heard more radio advertisements per capita than adults in 14 of the 15 largest US markets in 2003 Branded websites received up to 90 000 in-depth visits by under 21 individuals in 2003	4
Chung <i>et al.</i> (2010) ^a	US	Television	Beer, wine and distilled spirits advertisements grew by 16, 173 and 1658% during programming with greater 30% underage viewers between the 2001–03 and 2004–06 periods	6
Jernigan <i>et al.</i> (2013) ^a	US	Television	23.7% of all alcohol advertisements and 33.3% of all impressions occurred during programming with greater 30% youth in the 25 largest US markets in 2010	4
Ross <i>et al.</i> (2016) ^a	US	Television	From 2005 to 2012, youth were exposed to 15.2 billion non-compliant alcohol advertisement impressions There were 131.5 billion youth alcohol advertisement impressions overall	4
Federal Trade Commission (2008) ^b	US	Television, magazines, newspapers, radio	93.9% of television advertisements, 92.0% of radio advertisements, 99.8% of newspaper advertisements, and 98.5% of magazine advertisements were placed where more than 70% of the audience was 21 years old or older	1
Federal Trade Commission (2014) ^b	US	Television, magazines, newspapers, radio, digital	94.6% of nationally televised advertisements, 92.9% of radio advertisements, 99.4% of magazine advertisements, 100% of newspaper advertisements and 99.5% of online measured advertisements were placed where more than 70% of the audience was 21 years old or older	1
Winter <i>et al.</i> (2008) ^a	Australia	Television	13–17-year-old viewers exposed to comparable alcohol advertisements as 18–24–old viewers	3

(Continues)

Table 3 (Continued)

Authors/organization (year of publication)	Country	Medium	Main findings	Methods criteria met
Table 3. (Continued) Fielder <i>et al.</i> (2009) ^a	Australia	Television	13–17-year-olds exposed to 3.5–5.4 alcohol advertisements per week on Australian Free-to-Air TV	4
Davoren <i>et al.</i> (2012) ^a	Australia	Television	117 000 5–17-year-olds were exposed to up to 35 minutes of alcohol marketing	2
Ofcom (2013) ^b	UK	Television	1.4% of all advertisements seen by 4–15-year-olds was for alcohol in 2011, equaling 1.4 billion impacts	4
Alcohol Concern (2010) ^b	UK	Television	Advertisements viewed per week increased 18.5% from 2007	4
Alcohol Concern (2014) ^b	UK	Television	Up to 1.651 million 4–15-year-old UK youth exposed to alcohol advertisements per World Cup match in 2010	2
de Bruijn <i>et al.</i> (2012) ^b	Bulgaria, Denmark, Germany, Italy, the Netherlands	Television, outdoor & public	Nearly 100 alcohol references and 10 alcohol commercials were shown per World Cup match in 2014	2
Wimpenny <i>et al.</i> (2012) ^b	Germany, the Netherlands, UK	Television, digital	Under 18-year-old viewership surpassed 1 million in 3 of 6 matches studied	7
Phinsky <i>et al.</i> (1999) ^a	Brazil	Television	Each underage viewer exposed to 44 alcohol advertisements on average	5
Phinsky <i>et al.</i> (2010) ^a	Brazil	Television, outdoor & public	Overexposure to alcohol advertisements among youth range from 14 to 42%	5
Gordon <i>et al.</i> (2010) ^a	Scotland	Television, outdoor & public	In the UK and the Netherlands there is a positive association between younger viewers and advertisement intensity	5
Gordon <i>et al.</i> (2011) ^a	Scotland	Television	142 unique videos on YouTube have been created by 5 alcohol brands generating 9 584 371 views by March 2012	5
Fanning (2010) ^b	Ireland	Television, digital	These brands also had 578 197 'likes' on Facebook and 12 188 Twitter followers	2
Swahn <i>et al.</i> (2011) ^a	Zambia	Television	4.6% of all television advertisements are for alcohol	6
			78.1% of 14–17-year-olds report seeing an alcohol advertisement in the last week	
			91.4% report seeing point-of-sale alcohol advertisements	
			77% of 12–14-year-olds were aware of alcohol advertising on TV	
			In-store advertisements were among the top 5 forms of marketing 12–14-year-olds were most aware of	
			12–14-year-olds are aware of TV advertisements at greater rates than all other media	
			16–17-year-olds reported awareness of 19 sources of alcohol advertising	
			97% were aware of television advertising	
			38% of 16–21-year-olds report seeing an alcohol ad on Facebook or Bebo	
			24% report receiving an online quiz about alcohol or drinking	
			24% of 7–10th graders aware of alcohol advertising on television, in movies or in videos	

(Continues)

Table 3 (Continued)

<i>Authors/organization (year of publication)</i>	<i>Country</i>	<i>Medium</i>	<i>Main findings</i>	<i>Methods criteria met</i>
Collins <i>et al.</i> (2007) ^a	US	Television, magazines, radio, outdoor & public	Grade 6 students are estimated to be exposed to approximately 5 TV beer advertisements, 1.7 magazine alcohol advertisements, 1.9 radio alcohol advertisements and 4.5 in-store beer displays per week	6
Scharf <i>et al.</i> (2013) ^a	US	Television, magazines, radio, outdoor & public, digital	Over 14 days, 20 middle and high school students were exposed to 101 outdoor alcohol advertisements, 37 TV advertisements, 11 internet advertisements 2 magazine advertisements and 0 radio advertisements	2
Martino <i>et al.</i> (2016) ^a	US	Television, magazines, radio,	Middle school students were exposed to 23 446 alcohol advertisements over a 13-day period or 3.1 advertisements per day	5
Molloy (2016) ^a	US	outdoor & public Television, magazines	47% were outdoor & public, 26% were TV, 7% print and 6% radio 18–24-year-olds were exposed to 725 TV and 55 magazine alcohol advertisements in any 6-month period from 2000 to 2007	5
Patil <i>et al.</i> (2014) ^a	Germany, the Netherlands, UK	Television	10–15-year-olds in the UK were 1.11 times more likely to be exposed to alcohol advertising than adults ≥ 25 years old 13–19-year-olds in the Netherlands were 1.29 times more likely to be exposed to alcohol advertising than adults ≥ 20 years old	4
Jones <i>et al.</i> (2011) ^a	Australia	Magazines, outdoor & public, digital	47.7% of 12–17-year-olds report seeing an alcohol ad in a magazine 61% report seeing a billboard advertisement for alcohol	6
Fleming <i>et al.</i> (2004) ^a	US	Magazines, radio, outdoor & public	55% report seeing alcohol advertisements on the internet 15–20-year-olds report seeing 2.79 magazine advertisements, hearing 1.59 radio advertisements, seeing 2.48 billboards for distilled spirits per week	6
Garfield <i>et al.</i> (2003) ^a	US	Magazines	$\times 1.6$ more beer and liquor advertisements are placed in magazines for every additional million underage readers	7
The Center on Alcohol Marketing and Youth (2010) ^b	US	Magazines	29 026 alcohol advertisements placed in US magazines from 2001 to 2008 Youth exposure to alcohol magazine advertisements has increased by 20.3% from 2002 to 2007	4
King C III <i>et al.</i> (2009) ^a	US	Magazines	41.2% of all magazine advertisements from 2002 to 2006 were for alcohol	7
Jernigan <i>et al.</i> (2004) ^a	US	Magazines	Youth were exposed to more magazine alcohol advertisements in 2003 than 2001–02 period	4
Cousins <i>et al.</i> (2008) ^a	New Zealand	Newspapers	368 alcohol-related advertisements appeared in 5 on-campus college newspapers in 2005	5
Wolburg <i>et al.</i> (2009) ^a	Ukraine, US	Magazines	There were 42 unique alcohol advertisements from 25 different alcohol companies in 22 magazines in August 2006	4

(Continues)

Table 3 (Continued)

Authors/organization (year of publication)	Country	Medium	Main findings	Methods criteria met
Table 3. (Continued) Ross et al. (2014) ^a	US	Magazines	Male 18–20-year-olds were exposed to advertisements for 18 of the most consumed brands by youth equal to or more than any other group Female 18–20-year-olds were exposed to advertisements for 18 of the most consumed brands by youth equal to or more than any other group	4
Jernigan et al. (2006) ^a	US	Radio	67 404 radio alcohol advertisements for 24 of the top 25 alcohol brands in the 104 largest markets in 2004 14% aired during programming with greater than 30% youth audience 52% aired during programming with greater than 15% youth audience 27 682 alcohol advertisements placed during programming with greater than 30% youth audience in 2006 in the 28 largest US markets	5
The Center on Alcohol Marketing and Youth (2007) ^b	US	Radio	73 451 alcohol advertisements placed during programming with greater than 30% youth audience in 2009 in the 75 largest US markets	4
The Center on Alcohol Marketing and Youth (2011) ^b	US	Outdoor & public	14.1 outdoor alcohol advertisements per city block in Central Harlem, New York City	6
Kwate et al. (2009) ^a	US	Outdoor & public	25% of all outdoor advertisements in Central Harlem, New York City were for alcohol	5
Kwate et al. (2007) ^a	US	Outdoor & public	43.7, 45 and 24% of alcohol advertisements were within 152 m of schools, churches and playgrounds At least 1 advertisement was within 152 m of 79.4, 83.3 and 59.1% of schools, churches, and playgrounds	5
Scott et al. (2008) ^a	US	Outdoor & public	21.2 and 36.9% of alcohol advertisements were within 500 feet of a school, playground or church in 106 Louisiana census tracts and 114 Los Angeles, CA census tracts	5
McKee et al. (2011) ^a	US	Outdoor & public	There were 1701 storefront alcohol advertisements and 53 billboard or public transit advertisements per year from 2003 to 2005 in 450 census tracts in 10 US cities	6
Nyborn et al. (2009) ^a	US	Outdoor & public	There were 1.9 alcohol advertisements per subway car in Boston, MA and 18 296 impressions to 11–18-year-olds each day	5
Gentry et al. (2011) ^a	US	Outdoor & public	There were 1.7 alcohol advertisements per subway station in Boston, MA for a total of 185 212 impressions per day	6
Alcohol Justice (2013) ^b	US	Outdoor & public	14 of the 32 largest public transportation systems in the US continue to allow alcohol advertising	3
de Bruijn (2011) ^b	The Gambia, Ghana, Nigeria, Uganda	Outdoor & public	The density of billboards advertising alcohol can be up to 9 per 500 m of road in Uganda 27 advertisements detected near the center of Accra, Ghana 105 publicly viewable alcohol branded items within the center of Uyo, Nigeria	3

(Continues)

Table 3. (Continued)

<i>Authors/organization (year of publication)</i>	<i>Country</i>	<i>Medium</i>	<i>Main findings</i>	<i>Methods criteria met</i>
Kelly <i>et al.</i> (2008) ^a	Australia	Outdoor & public	25 alcohol advertisements per km ² within 250 m of schools	6
Mastro <i>et al.</i> (2002) ^a	US	Outdoor & public	66 outdoor alcohol advertisements within 5 miles of a single, Mid-western US high school	5
The Center on Alcohol Marketing and Youth (2004) ^b	US	Digital	611 800 in-depth visits to 55 alcohol branded websites by underage individuals in 2003	4
Lin <i>et al.</i> (2012) ^a	New Zealand	Digital	14.6% of 13–14-year-old New Zealand youth were aware of alcohol branded social media sites, 24.4% of downloadable screensavers, 11.7% of websites and 6.1% of e-mail advertising	5
Mart <i>et al.</i> (2009) ^a	World-wide	Digital	By 2009, there were 93 Facebook pages created for alcohol brands with 1.1 million fans plus 500 applications, 2200 sponsored events and 58 000 groups associated with alcohol	3
Jernigan <i>et al.</i> (2014) ^a	US	Digital	Brands popular among youth had in excess of 1 000 000 Facebook 'likes' and 100 000 user submitted comments	3
Wimpenny <i>et al.</i> (2014) ^a	UK	Digital	Median Facebook 'likes', YouTube subscribers and Twitter followers for 5 top UK brands was 122 486, 49, and 3310, respectively	4
McClure <i>et al.</i> (2016) ^a	US	Digital	59% of 15–20-year-olds reported seeing online alcohol advertising 6% reported going to an alcohol-branded website and 3% reported being an online fan of a brand	5
Nhean <i>et al.</i> (2014) ^a	US	Digital	1017 company-sponsored, alcohol-branded sites were located on Facebook	3

GRP's = gross rating points.

Table 4 Percentage of studies meeting each methodological criteria.^a

Questions	Content papers				Exposure papers				
	Peer-review (n = 31)		Non-peer-reviewed (n = 13)		Peer-review (n = 42)		Non-peer-reviewed (n = 15)		Total (n = 57)
		Total (n = 44)		Total (n = 44)		Total (n = 42)		Total (n = 15)	
Were inclusion and/or exclusion criteria for the advertisements included in the study specified?	100	53.8	86.4	89.5	95.2	73.3	89.5		
Was a rationale for the use of the inclusion and/or exclusion criteria provided?	64.5	23.1	52.3	40.4	47.6	20.0	40.4		
Was the method of advertisement collection specified?	54.8	38.5	50.0	91.2	92.9	86.7	91.2		
Was a rationale for the advertisement sample size provided?	29.0	0.0	20.5	17.5	16.7	20.0	17.5		
Was the length of time required to rate the advertisements specified?	25.8	15.4	22.7						
Were the characteristics of the raters provided?	74.2	7.7	54.5						
Were the advertisements rated using a validated instrument?	32.3	7.7	25.0						
Were a sufficient number of raters used to rate the advertisements?	29.0	0.0	20.5						
Was a measure of inter-rater reliability calculated and reported?	38.7	0.0	27.3						
Was the method of rating the advertisements specified?	45.2	7.7	34.1						
Were potential sources of bias explicitly identified?	25.8	7.7	20.5	29.8	35.7	13.3	29.8		
Were study limitations identified?	74.2	7.7	54.5	63.2	78.6	20.0	63.2		
Was statistical methodology utilized?	58.1	7.7	43.2	45.6	59.5	6.7	45.6		

^aFrequencies based on Rater 1 ratings.

aged 15–20 reported hearing more alcohol advertisements (1.59) than 21–29-year-olds (1.27) in a typical week [94].

Outdoor and public advertisements

Eighteen studies conducted in nine different countries evaluated exposure to outdoor and public advertisements, which consist of billboards, in-store or point-of-sale posters and advertisements on the walls and vehicles of mass transit systems [65,78,87,95,101,102,111–119]. US youth reported seeing multiple billboards for distilled spirits each week [102], and a majority of Australian youth reported seeing alcohol-branded billboard advertisements [101]. In Scotland, in-store advertisements were among the top five forms of alcohol marketing seen by youth [87], and 91.4% of youths in Brazil reported seeing point-of-sale alcohol advertisements [78]. In Australia, Ghana, Nigeria, Uganda and the United States, multiple studies reported a substantial amount of alcohol advertising near locations with high concentrations of youth [65,111–119]. In areas with few outdoor alcohol advertisements, such as Bulgaria or Italy, large-sized billboards, visible for long distances, may be used [95]. Youth exposure may also occur on US mass transportation systems, including on subway cars, subway stations, buses and bus stops [114–116].

Digital media

Thirteen studies have investigated youth exposure to digital alcohol advertising [45,69,83,89,94,97,101,120–125]. There is high awareness of online alcohol marketing among youths in Australia, New Zealand and Ireland [89,101,120]. By 2009 high levels of alcohol marketing were detected on social media platforms [121], and the presence of alcohol marketing on these platforms has only increased over time [45,122,123,125]. Between January and June 2011, 99.5% of online alcohol advertisements complied with the industry's 30% threshold, according to the FTC [83].

Evaluation of study methods

Gaps in methodology of peer-reviewed papers and non-peer-reviewed reports are described in Table 4. In examining alcohol advertisement content and exposure, few studies provided rationales for the sample size used or described potential sources of bias. Conversely, nearly all studies identified inclusion and exclusion criteria. Peer-reviewed publications met significantly more methods criteria than non-peer-reviewed reports when researching content ($U = 27.5$, $P < 0.001$, $r = -0.68$) and exposure ($U = 523.0$, $P < 0.001$, $r = 0.50$) (Table 5).

Gaps in research coverage by geographic region and medium are evident (Table 5). Publications principally concerned countries in the Americas (58.3%), Europe (22.9%) and the Western Pacific (14.6%). Publications containing

information on television (56.3%) and magazine or newspapers (35.4%) were most prevalent.

DISCUSSION

Main findings

Our review demonstrates that alcohol advertisements consistently violate the content guidelines of alcohol marketing self-regulatory codes and contain themes that could be considered inappropriate for children, adolescents and other vulnerable populations, with little variation across time. Of the 19 code studies and 25 content analysis studies reviewed, all detected content that could be considered potentially harmful to youth.

Beyond content, exposure studies evaluated the extent to which vulnerable groups are likely to be exposed to alcohol marketing. Although several different methods have been used to measure alcohol advertising exposure, the 57 studies reviewed from 18 countries demonstrate high exposure to alcohol advertising and high awareness of alcohol advertising among youth.

Other findings

Alcohol marketing has used similar thematic elements consistently over time, suggesting that self-regulation has not impacted the content of alcohol advertising significantly. The use of physical success, health, humor and relaxation was documented in the 1980s, 1990s and 2000s [49,50,53,54]. The use of young, attractive or famous models was also documented across these periods. An important change that has occurred is the use of youth-oriented content, with cartoon characters in television advertisements and the availability of youth-oriented digital content being observed in more recent studies [58–63].

Although compliance with the alcohol industry's youth exposure guidelines has increased over time, the number of youth exposed to and aware of alcohol advertising has also increased, suggesting that current exposure thresholds may need to be lowered or the guidelines strengthened by using additional exposure metrics. For example, one study found that alcohol advertisements were more likely to appear in magazines with underage readers [77]; another study found that youth may be exposed to more advertisements than adults on a per-capita basis [105]. For outdoor advertising, IARD's *Guiding Principles* do not include restrictions on the proximity of outdoor advertisements to schools or other locations, and it is possible that fewer than 30% of the residents of the census tract where a school exists are under the legal purchase age [19]. Under such conditions, alcohol advertisements placed immediately adjacent to a school would not constitute a violation of the exposure guidelines. Moreover, digital alcohol-branded content may be easily accessible

Table 5 Comparison between peer-reviewed papers and non-peer-reviewed reports according to geographic location of study, communication medium investigated and methods criteria met.

	Peer-reviewed papers	Non-peer-reviewed reports	All publications
<i>n</i> (%)	71 (74.0)	25 (26.0)	96 (100)
Reports by WHO region (%) ^a			
Africa	1 (1.4)	1 (4.0)	2 (2.1)
Americas	46 (64.8)	10 (40.0)	56 (58.3)
Eastern Mediterranean	0 (0.0)	0 (0.0)	0 (0.0)
Europe	10 (14.1)	12 (48.0)	22 (22.9)
South-East Asia	1 (1.4)	1 (4.0)	2 (2.1)
Western Pacific	14 (19.7)	0 (0.0)	14 (14.6)
World-wide	1 (1.4)	1 (4.0)	2 (2.1)
Medium (%) ^a			
Television	37 (52.1)	17 (68.0)	54 (56.3)
Magazines/newspapers	25 (35.2)	9 (36.0)	34 (35.4)
Radio	7 (9.9)	6 (24.0)	13 (13.5)
Outdoor & public advertisements	18 (25.4)	9 (36.0)	27 (28.1)
Digital media	11 (15.5)	10 (40.0)	21 (21.9)
Movies	0 (0.0)	2 (8.0)	2 (2.1)
Methods criteria met ^b			
Content ^c	7.0 (5.0–8.5)	1.0 (0–3.5)	6.0 (4.0–8.4)
Exposure ^d	5.0 (4.0–5.5)	3.0 (2.0–3.5)	4.0 (3.1–5.0)

^aPercentages may not sum to 100% for each column, as a publication can contain information on more than one region or medium; ^bMedian(IQR); ^ccontent: $U = 27.5.0$, $Z = -4.49$, $P < 0.001$, $r = -0.68$; ^dexposure: $U = 523.0$, $Z = 3.798$, $P < 0.001$, $r = 0.50$.

to youth, as existing age-gating technology is ineffective [126,127], and youth may use false information to gain access to such content [127].

Implications and recommendations

To the extent that the current evidence suggests widespread circumvention of the spirit and the letter of alcohol marketing regulations, several alternatives should be considered. The first is a total ban or rigorous statutory regulation of alcohol marketing along the lines of the Loi Évin or Thailand's Alcohol Control Act, which states that no alcohol advertisement can contain information that would induce another person to drink [6,128]. If rigorous statutory regulation is politically unfeasible, improvements in current self-regulated exposure guidelines could be implemented as an interim step. These include stronger exposure and content guidelines, enhanced enforcement, stricter penalties for violators and an alternate code interpretation.

There are several ways in which the exposure and content guidelines of alcohol marketing self-regulated codes could be strengthened. The audience composition threshold for individuals under the legal purchase age could be reduced. As evidenced by the high rates of youth exposure, a rate benchmarked to, or near, the population proportion of underage youth is inadequate to prevent alcohol marketing exposure. This threshold should be based on the audience composition data available to the alcohol industry as

stated in their buying guidelines. For example, the US Beer Institute's advertisement-buying guidelines state that audience composition data can be available for the 12+ or the 18+ populations [129]. When information on the 12+ population is available, the threshold should be benchmarked to this rate, which is approximately 15% in the United States [130]. When information on the 18+ population is available, the threshold should be similarly benchmarked, which is approximately 5% in the United States.

For television and radio, if exposure guidelines specify exact times when alcohol advertisements can be broadcast, such as from 11:00 p.m. to 6:00 a.m., there should be no exceptions. However, caution should be taken with this approach. Instead of reducing the volume of alcohol advertising, alcohol advertisements may simply become more concentrated, thus increasing exposure to teens and young adults who are in the broadcast audience [93]. Moreover, to prevent youth exposure to digital content, systems that require validation of personal information, such as a driver's license number or passport number, should be implemented.

Stronger content guidelines can be developed to eliminate loopholes. Code regulations may be purposefully vague and multiple interpretations of the same regulation can result. For example, guidelines designed to protect underage populations often use the term 'primarily' to distinguish content that is generally attractive to all audiences versus content that is specifically attractive to those who

are underage [19,20,22,23]. The use of this term provides alcohol companies with a readily available justification for using content that is attractive to youth, but not overtly so.

Enhanced enforcement of advertising codes can occur through a pre-clearance mechanism, where a panel of health professionals and representatives of vulnerable populations would review all communications using reliable content rating procedures to identify code violations before advertisement dissemination [37,131]. Advertisement dissemination through any medium would be prohibited until panel approval is granted. Under current systems, code enforcement occurs primarily through complaints made by concerned citizens or watchdog groups after an advertisement has been published.

Penalties against code violators may be necessary for deterrence. Although IARD's *Guiding Principles* contain brief language on code implementation and a complaint process, penalties for violating the code are not discussed [19]. Because complaints and code enforcement occur after advertisement distribution, an advertising campaign may have concluded by the time a complaint is adjudicated, effectively eliminating advertisement removal as a deterrent. The institution of penalties, such as those described by the Loi Évin (i.e. monetary penalties, removal of existing advertising, banning future sales for repeat offenders) will be essential in systems that lack a pre-clearance mechanism [6].

An alternate perspective for guideline interpretation, one based on principles of developmental psychology and public health rather than legal definitions, is necessary. The harmful effects of alcohol advertising are probably mediated through the perceptions of the viewers. Evidence of this is available through a number of studies demonstrating the attractiveness of alcohol advertising to youth [3,132]. When alcohol advertisements are reviewed, the perception of advertisement content by public health professionals and members of vulnerable populations must be taken into account in the determination of code compliance. Such an interpretation may also decrease the impact of built-in guideline loopholes.

Studies of alcohol content require standardized methods, a sufficient number of raters and a standard advertising code [131]. Rating systems that are designed to build group consensus, such as the Delphi method, have been shown to identify effectively violations of the content guidelines of self-regulated alcohol marketing codes [32,37,131]. With the development of IARD's *Guiding Principles* and promotion of these guidelines as the benchmark for self-regulation, a standardized rating form could be developed that will apply to all locations where self-regulation predominates [19].

Studies of alcohol exposure require an objective, standardized measurement of self-reported advertisement exposure, suitable for multiple age groups, and a single,

standardized measure of advertisement placement to improve interstudy comparability. Comparable measurements must also be developed for outdoor and public advertisement exposure and for exposure to digital alcohol-branded content. Assessing exposure to digital content may pose a particular challenge as social media platforms can be accessed from smartphones or tablet apps, bypassing standard internet traffic monitoring systems. Research should also be expanded to increase geographic diversity. There are a number of WHO regions where data on alcohol advertising is non-existent.

Limitations

One limitation of this review is the inclusion of only English language papers and reports. There may be pertinent non-English publications that were overlooked due to language barriers. In addition, no attempt was made to perform a meta-analysis, although a methodological analysis was conducted. The disparate methodologies used in the reviewed publications are not conducive to a meta-analysis, and any results would be difficult to interpret. Other limitations pertain to the geographic locations and media covered by the available research (see Table 5). The lack of research in developing countries is particularly notable in light of the increased amount of alcohol marketing in these countries [133]. Another limitation is the relative lack of research on alcohol advertising in media other than television and print. Evaluation research on digital content and movies is needed to monitor increased industry attention to these media. Finally, we were unable to determine alcohol advertisement exposure to other vulnerable populations, such as pregnant women, minorities or people with alcohol dependence, as current literature focuses exclusively on youth exposure.

CONCLUSIONS

Despite methodological concerns the studies reviewed here, utilizing multiple research methods, demonstrate that a significant proportion of alcohol marketing contains content that may be attractive to youth and that youth are exposed disproportionately to alcohol marketing. Regarding the content of alcohol advertising, there were 19 studies that referenced an advertising code, and 15 concluded that self-regulation was ineffective. None concluded that self-regulation was effective. Regarding exposure to alcohol marketing, youth continue to be exposed to high rates of alcohol marketing even though the alcohol industry may be complying with their own exposure thresholds. Taken together, the findings of this review suggest that the current self-regulatory systems that govern alcohol marketing practices are not meeting their intended goal of protecting vulnerable populations. Based on the

precautionary principle, major modifications of the current system, or the implementation of statutory regulations in the interests of public health, are needed.

Declaration of interests

None.

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Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher's web-site:

Appendix S1 Grading criteria for content and exposure studies.