

Title: Is popular radio a source of exposure to alcohol references in mid to later life? A content analysis.

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Abstract

Background: There is concern around alcohol consumption in mid to later life yet little understanding about what influences this behaviour. No previous research has explored the extent to which adults in mid to later life may be exposed to alcohol references in the media. This project aimed to determine the frequency of alcohol references on radio stations with a high proportion of listeners in mid to later life.

Methods: Content analysis of alcohol references on four popular UK music-based radio stations with a high proportion of listeners aged 55-64 years over three time points.

Results: Alcohol references occur frequently, but vary by time of year and type of radio station.

When alcohol is mentioned its consumption is portrayed as the norm, without negative consequences. On three commercial stations, the majority of mentions came from advertising, whereas on BBC Radio 2 nearly all references were talk-based. All adverts for direct promotion of alcohol were by supermarkets. Alcohol was frequently associated with celebrations, socialising, or something to consume for its own sake.

Conclusions: Adults in the age group 55-64 may be exposed to references to alcohol that could serve to reinforce norms of consumption of alcohol and promote purchases of cheap alcohol. Word count: 200 (Max 200)

Introduction

Alcohol consumption remains a significant global public health problem¹⁻². Consequences of drinking are related to consumption amounts and patterns, with many western societies' characterised by chronic overconsumption or acute, high-intensity, consumption³. In the UK adults in mid to later life consume alcohol more frequently than other age groups with men aged 55–64 years consuming the most number of alcohol units per week⁴ while 27% of Europeans aged over 54 years report binge drinking (consuming five or more drinks) on a weekly basis⁵. For both males and females the number of alcohol-related deaths in the UK is highest for those aged 55 to 64 years⁶ and risk of mortality over 20 years is increased among individuals aged 55–65 years consuming a daily average of 3 standard drinks (42 g alcohol)⁷.

Exposure to alcohol promotion is associated with initiation and progression of alcohol use, as well as pro-drinking attitudes, in younger people⁸⁻¹³. Such exposures are found in different media, such as music lyrics and videos, television programmes and sponsorship, radio advertising, magazine articles and advertising, and social media¹⁴⁻¹⁷. Despite research investigating these effects in younger people, no research has investigated the prevalence of alcohol promotion in media that might be more likely to influence adults in mid to later life.

In the UK, mid to later life is typically associated with the transition from full-time paid work to retirement. Because of the increasing proportion of the population in mid to later life there is interest in the health-related behaviours of this group and the ways in which healthy ageing may be influenced¹⁸⁻²⁰. This cohort are of particular interest because of their unique characteristics: they currently represent the first generation to have been consistently exposed to mass media advertising throughout their lives²¹; they have been the first generation to grow up in a consumer society and be relatively wealthy throughout most of their adult lives²¹; and many have large amounts of disposable income, and thus are an economically powerful group²². It is for these reasons, along with evidence of increasing levels of drinking among adults in mid to later life²³, that

further research exploring the links between alcohol, the media and this age group is crucial. There is a need for greater understanding about what influences perceptions and norms of drinking behaviour and ways in which harmful drinking in mid to later life might be addressed.

Research exploring alcohol portrayals in the media has focused on television, films and print media with little attention to other forms such as radio. One previous UK study which investigated alcohol references and radio broadcasting focused on the likely exposure on adolescents and younger adults²⁴. This study found that alcohol was often used to create and maintain a shared identity between presenters and the audience, and alcohol references tended to reinforce socio-cultural norms²⁴. The aim of this project was to conduct a content analysis of UK broadcast radio, with a high proportion of listeners in the 55-64 age group, to determine the frequency, type and content of references to alcohol.

Methods

Identifying stations

Data were obtained from Radio Joint Audience Research (RAJAR) which is responsible for measuring radio audiences in the UK²⁵. RAJAR reports on around 310 stations, including all British Broadcasting Corporation (BBC) stations as well as the vast majority of local commercial and community radio stations. A report was obtained that provided a breakdown of listenership data for the peak period of 1600 to 1900 hours during weekdays. This provided a further breakdown of listenership by age bands, so that the proportion of listeners in the 55-64 age band to all adult listeners could be identified. Data reported by RAJAR provided average hours per listener and overall population reach, for each radio station reported on. RAJAR data was sorted to rank stations in order of population reach (the total number of adults aged over 15 years who live within the area in which a station's audience is measured). In order to include only stations with a large population reach (and thus most likely to have impact on large numbers of peoples' behaviours), only stations with a population reach above the median population reach for all stations were included.

For each station, the ratio of average hours for listeners in the 55-64 age group, to the average hours for all adult listeners, was calculated so that both the average hours, and the proportion of listeners in the age group of interest compared to all listeners, were taken into account. The rationale for this was to ensure that the selected stations had a disproportionately large number of listeners in the category of interest, as opposed to a high absolute number of listeners in mid to later life. As this data is available to, and potentially used by, commercial organisations, this was hypothesised to be of importance, as advertisers may seek to target listeners in mid to later life by identifying stations that have a high proportion of listeners in this age group, coupled with substantial population reach.

Finally, sampled stations were primarily music-based, as much UK commercial radio broadcasting is of this nature. Including different types of station, such as talk-based radio, would lead to comparing

across heterogeneous categories of programming. Stations were thus sorted by the ratio described above and then selected based on the following five criteria:

1. Primarily a music-based station, e.g. not talk-, news- or sport-based
2. Not targeted at a particular demographic that precludes mentions or advertising of alcohol, e.g. stations targeted at British Asians
3. A commercial radio station (funded by the selling of advertising airtime)
4. Available to be listened to via traditional mediums (FM and digital radio)
5. Shown as an individual station (not a station grouping) and available to record using Audials internet-recording software.

One national BBC radio station was selected as a comparator, so that the contributions to alcohol references from advertising alone could be compared with a station not reliant on advertising revenue, and other mentions of alcohol could be compared between stations with and without paid advertising. The BBC radio station selected was the first on the sorted list (as described above) that was primarily music-based. The focus on radio stations with a high proportion of listeners in the 55-64 age group was to understand how media might influence those around the retirement age, a critical life transition point. Based on the way that RAJAR data are reported by age bands; data were only available on the 55-64 age group, and then adults aged 65+. Using data for adults aged 65+ would have included all older adults which is arguably a more heterogeneous group and would also include the oldest old as well as those in early retirement.

Data collection

Recording was pre-programmed using Audials internet-radio recording software over three purposively sampled two-week periods during December 2014, February and April 2015. The first time period was chosen to correspond with the approach to Christmas and New Year, during which it was anticipated that there may be a large number of references to alcohol. The other two time periods were chosen as the corresponding weeks of the month at approximately two-month

intervals from December onwards. The software was set to record for each selected radio station between 1600 and 1900 hours at 3 time points, all of which were weekdays. Each sample consisted of recordings made over a ten day period, of which three days were then selected for coding and analysis using random numbers generated using Minitab software²⁶. In the case of failed recordings, the next available day before or after the selected day were chosen for coding. This process was repeated for each recording period. It was planned that each day would contain twelve hours of radio broadcasts (three hours for each of the four selected stations) to give a total of 108 hours of radio programming to be coded and analysed.

Content analysis

Content analysis is a systematic way in which to analyse media, and is frequently used to reveal patterns in media output²⁷. To quantify references to alcohol made during broadcast radio programmes, not only was the frequency of references counted, but also detailed characteristics of the reference. These were:

- Type and duration of reference, e.g. advert, presenter mention
- Part of programming that reference occurred, e.g. commercial break, chat segment
- Reference type, e.g. reference to effects of alcohol
- Whether the reference encouraged consumption per se, or a specific type, e.g. excessive
- Whether a 'drink responsibly' message was provided
- Contextual information about the reference, e.g. location, type of drinking, drinking prompt
- Emotions or experiences linked to consumption or purchase of alcohol

A codebook (available on request) was formulated and piloted, based on a previous content analysis of references to alcohol during televised football matches²⁸, but adapted to be used for coding radio programmes. A previous study that assessed the content of radio programming in relation to alcohol and younger people was also reviewed for additional coding categories²⁴. For commercial stations

only, total advertising time was also captured in order to calculate the proportion of alcohol advertising as a percentage of total advertising time. Piloting was an iterative process. The prototype code book was developed through discussion of what data were needed to answer the research questions and by looking at what content categories had been coded for in the previous study of alcohol and radio²⁴. Once the prototype was developed, it was used to code a radio recording. During this process, any difficulties that arose were noted – such as ambiguous categories, or data not being sufficiently captured, such as the length of each commercial break that would go on to permit calculation of the alcohol adverts as a proportion of all adverts. Changes were then made to the code book, and re-piloting took place until a satisfactory version of the code book, that captured the required data sufficiently, was agreed upon.

Analysis, conducted in SPSS v13²⁹, was descriptive, presenting counts, frequencies, percentages and averages of numbers of references to alcohol, stratified by time period and radio station. Examples of verbatim quotes from the radio broadcasts are used to illuminate findings. The content analysis was conducted by one of the authors (JH) in part submission for an MSc in Public Health and Health Services Research under the supervision of the co-authors (CH and SS). JH had research experience and training prior to conducting the content analysis. In order to provide a measure of reliability of coding, a second researcher coded ten percent of the total recorded broadcast hours. Krippendorff's alpha was calculated as the recommended statistic for calculating inter-rater reliability in content analyses³⁰⁻³¹.

Sample

Four stations were selected comprising three commercial stations and one BBC station (see table 1). The commercial stations covered different geographical areas in the UK and had a large population reach; BBC Radio 2 covers all of the UK. XFM had the highest ratio of listeners in the 55-64 age category to all adult listeners (for the time band of interest: weekdays 1600-1900). BBC Radio 2 had a broad age range of listeners but, because of its national coverage, was most likely to reach the

largest absolute number of adults in the 55-64 age group. The commercial stations all had similar formats, typically comprising 10-20 minutes of continuous music followed by a 2-3 minute commercial break segment, brief interludes of presenter talking, hourly news, and occasional other segments such as phone-ins or competitions. BBC Radio 2 had a slightly different format, in that it did not include commercial advertising (as with all domestic BBC broadcasting). Because of this, there were extended talk-based, guest and topical segments compared to the commercial stations.

Table 1 here

Results

Thirty-six broadcasts totalling 103 hours were coded rather than the 108 hours as intended. This was due to some failures in the software that was used to record the radio broadcasts that saw five hours of shows that should have been recorded, not recorded.

Frequency

We identified 151 references to alcohol (see table 2). Time point 1 (December 2014) had the highest total number and mean number of references per hour. BBC Radio 2 had the highest number of references to alcohol overall (n=49). Adverts for alcohol, or which made reference to alcohol, made up over 90% of all references to alcohol on commercial stations. Greater variation in reference length (11.1 seconds to 33.0 seconds) was seen for BBC Radio 2, where references were typically talk-based and more varied in context.

Table 2 here

Types of references

On BBC Radio 2, the greatest proportion of references to alcohol came from presenters reading out listeners' social media messages. The small proportion that came from adverts on BBC Radio 2 were adverts for other BBC shows (see figure 1).

Figure 1 here

On all stations, around two thirds (65.3%) of alcohol references were for specific types of products, i.e. wine or beer; with wine the most frequently mentioned product (33.9%). The remainder referred to drinking in general (9.1%), the effects or consequences of drinking (5.8%), or sensible drinking messages (5.2%). For commercial stations, there was a modest amount of advertising promoting sensible drinking (9.8%). Drunkenness was mentioned more on BBC Radio 2 than on commercial

stations (12.2% vs 2.9%); any references to drunkenness were talk-based rather than advertising (see table 3).

Table 3 here

Adverts

There were 155 brand mentions across 92 adverts. Over two thirds (n=61; 66.3%) were specific promotions for alcohol products or brands. These were all by supermarkets or convenience store chains; there were no adverts by alcohol producers (see table 4). A small number of adverts made reference to alcohol but were not actually alcohol-specific, for example, an advert for soup that made reference to wine:

“...what counts as one of your 5-a-day, I thought red wine might, because it's got grapes in it, but sadly not...”

Table 4 here

The proportion of advertising devoted to alcohol ranged from 6.2% at time point 1 (December 2014) to 4.2% at time point 3 (April 2015). In contrast, counter-advertising (messages warning about alcohol's effects) was only evident at time point 1 (December 2014) and constituted only 2.8% of all advertising. Supermarkets' adverts for alcohol represented the largest proportion of alcohol advertising time at 2.6% overall (range 0.9% - 4.3%). Over 70% (n=46) of adverts provided a 'please drink responsibly' warning (see table 5).

Table 5 here

Given that the majority of adverts were by supermarkets for branded products, supermarket names were counted (see figure 2). Co-operative had the largest number of adverts, often promoting itself as a place to shop for last-minute or forgotten items, for example in the following advert for Taylor's Port:

Character 1 - female: [sound of door opening] “David, you did remember the port and cheese for tonight didn’t you?”

Character 2 - male: “Er, yes” [sound of door closing again]

Voiceover - female: “With Taylor’s Port half-price, help is only a Co-op away this Christmas.”

Figure 2 here

Content

On commercial stations the most frequently suggested location of drinking was in a bar, pub or restaurant (23.8%). However, in over half of cases, no location was suggested (53.9%). To a lesser extent were suggestions of drinking either at a party (14.1%), at home (7.8%) or at a festival (1.0%). Most location references were from commercial adverts, except for ‘at a party’, where 5 out of 13 references were talk-based and mainly made by presenters in reference to attending Christmas parties. On BBC Radio 2 the majority (57.1%) of references to alcohol did also not suggest a drinking location.

In total, 159 consumption prompts were identified. Just under half, on commercial stations, were related to celebration with around a third linked to socialising. However, on BBC Radio 2, no intake prompts were identified for just under half of the sample (see supplementary data 1). A small proportion of references, on both commercial stations and BBC Radio 2, suggested that alcohol be consumed with food (11%), and a small proportion was also linked to suggestions of binge drinking (9%) (see supplementary data 2).

Alcohol was often implied as a staple, necessity or norm, or as something to give as a gift. Many adverts for alcohol invoked humour; talk-based references also frequently associated alcohol consumption with humorous outcomes. Around 90% of all associations identified were either positive or neutral, with few associations being negative or discouraging of drinking (see supplementary data 3).

Inter-rater reliability

In terms of reliability of coding, most variables had good or excellent inter-rater reliability according to Krippendorff's alpha e.g. segment of programme ($\alpha=0.78$, 95%CI=0.48-1.00); type of alcohol ($\alpha=0.98$, 95%CI=0.93-1.00); type of consumption ($\alpha=0.92$, 95%CI=0.77-1.00); level of consumption ($\alpha=0.77$, 95%CI=0.42-1.00); and presence or absence of 'drink responsibly' warning ($\alpha=0.87$, 95%CI=0.67-1.00). However agreement on some variables was poor, particularly ones that required a judgement about the reference e.g. location ($\alpha=0.50$, 95%CI=0.25-0.75); socio cultural associations ($\alpha=0.42$, 95%CI=0.25-0.58); prompts ($\alpha=0.43$, 95%CI=0.26-0.63).

Discussion

Main finding of this study

References to alcohol on both commercial and non-commercial UK radio stations likely to have a high proportion of listeners in mid to later life occur frequently, but vary between time of year and type of radio station. On commercial stations, the majority of alcohol references came from advertising with few talk-based references, whereas on BBC Radio 2 there were many talk-based references. Further, where alcohol is mentioned its consumption is often portrayed as the norm and without negative consequences. Some counter-advertising was identified on commercial stations, mainly in the form of an anti-drink-driving campaign around Christmas time. Nevertheless, the majority of alcohol references were either neutral (neither discouraging of alcohol nor explicitly prompting consumption) or positive in their portrayals of alcohol. Adverts typically used humour or were light-hearted in tone. Alcohol was frequently portrayed as something associated with celebrations and socialising. Whilst responsible drinking messages were provided in 70% of identified alcohol references, these were often vague and ambiguous, for example by simply stating 'please drink responsibly' at the end of an advert.

What is already known on this topic?

Research has previously explored the prevalence of talk-based references to alcohol on radio stations likely to have a high proportion of younger listeners²⁴. Over 1200 hours of airtime 703 comments relating to alcohol were identified, 244 involving presenters. The number of comments relating to alcohol differed between stations, with less on the BBC than on commercial stations and being influenced by music genre. Seventy-three percent of comments initiated by presenters encouraged drinking compared with 45% of comments from all sources. The majority of comments from presenters portrayed drinking in relation to partying and socialising.

There is also evidence that alcohol advertising influences drinking behaviour and intentions, at least in younger adults³². In addition alcohol portrayals in movies, music video and soap operas can influence the onset and progression of alcohol consumption in young people, suggesting that it may not just be advertising that is responsible for such influences³³.

What this study adds

Our research suggests that the prevalence of talk-based references to alcohol on stations sampled to have a larger proportion of listeners in mid to later life may be as prevalent as, if not more prevalent than, references to alcohol on stations aimed at younger listeners. Seasonal trends were found across both studies, with references peaking around Christmas time. In the present study however, few talk-based references were found on commercial stations, whilst the opposite was true in the research by Daykin²⁴. On commercial stations in this study, most references were from advertising however there is no research examining how either advertising or talk-based references to alcohol might influence drinking behaviour in mid to later life.

According to psychological theory, marketing encourages alcohol consumption by normalising use and emphasising the positive effects of consumption via two sets of processes, conscious and non-conscious. The conscious (explicit) processes include making attitudes to alcohol more favourable and increasing positive aspects of its use. Non-conscious (implicit) processes include priming, imitation, and associative learning, through which general approach orientations towards alcohol are activated³⁴. Evidence from marketing theory shows that advertising campaigns are designed to raise awareness, interest, and identification with products, associating them with certain emotions and experiences, and increasing the number of contexts in which use of the products is seen as appropriate. These marketing campaigns are also typically targeted at distinct demographic subgroup³⁵.

However, all direct promotions for alcohol on commercial stations in this sample were by supermarkets or other retailers, but not alcohol producers, and were mainly price- or offer-based

promotions rather than general promotion of a brand or product. This may suggest that alcohol producers are choosing not to use radio as a medium to advertise their products, at least not on the stations sampled, yet supermarkets are. This raises the question of whether supermarkets are using alcohol as a loss-leader. In a 2008 briefing paper by the Institute of Alcohol Studies, the tactic of supermarkets using alcohol as a loss-leader was discussed at length³⁶. The aim of such commercial behaviour is to attract customers to one of the company's stores to buy alcohol in the hope that customers will buy other products.

Public health has traditionally focused on the effects of advertising on younger people, meaning that the effects that such influences might have on other demographic groups have been overlooked. Whilst UK government policy and cabinet strategy has been vocal on the issues of binge drinking, particularly that engaged in by younger people in town and city centres, it has been oddly silent on the increasing numbers of adults in mid to later life potentially developing serious health problems because of heavy drinking undertaken at home, arguably facilitated by cheap and readily available alcohol available from supermarkets³⁷. Whilst this study can in no way make any claims as to the likely impact upon drinking behaviour and actual alcohol consumption, the findings show that adults, in the age group 55-64, are being exposed to references to alcohol that could serve to reinforce norms of excessive consumption and promote purchases of cheap alcohol. Given the increase of the ageing population, many of whom have been shown to often drink above recommended levels and to be particularly vulnerable to the deleterious health effects of alcohol, increasing attention should be paid to how patterns of drinking in adults in mid to later life are influenced, and the role that the media may play in shaping and reinforcing norms around alcohol.

Currently there is no policy related to alcohol and media in adults, particularly radio; and as stated above no attention is given to the ways in which the media might have an influence on alcohol consumption in mid to later life. Given that this study has shown that references to alcohol, both advertising and talk-based, are ubiquitous on radio that might have a high proportion of adults in

mid to later life, a better understanding of how the media might influence drinking behaviours in this age group would help to inform future policy development.

Limitations of this study

This study is the first of its kind to investigate references to alcohol during radio broadcasting with a specific focus on listeners in the 55-64 age group. Selection of radio stations was based on objective data on UK radio reach and listenership and data were collected at three time points to allow for seasonal variation. It was not possible within the constraints of this project to obtain data about the socio-demographic profiles of stations' listeners, which may have allowed for exploration as to how different stations have the potential to differentially influence different socio-demographic groups. Only one part of the day was selected for recording. Although this part of the day may attract the most listeners in absolute terms, it may not be the time of day or day of the week when listeners attend most to adverts or talk-based references. The expected sample at time point 2 was not achieved due to multiple software failures. Thus, some of the days that were selected to be used in the sample had to be changed to other days that had recorded successfully. Although these software failures appeared to be a random occurrence, there is the possibility that reselection of days could have led to some bias in the results. Finally, inter-rater reliability for some of the coded variables was poor. These were mainly subjective in nature, where it was expected that there may be some level of disagreement.

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References

1. OECD. Tackling Harmful Alcohol Use. Sassi F, editor: OECD Publishing; 2015
2. World Health Organization. Global status report on alcohol and health-2014: World Health Organization; 2014
3. La Vecchia C, Bosetti C, Bertuccio P, Castro C, Pelucchi C, Negri E. Trends in alcohol consumption in Europe and their impact on major alcohol-related cancers. *European Journal of Cancer Prevention*. 2014; 23(4): 319-22
4. Office for National Statistics. Chapter 2 – Drinking - General Lifestyle Survey Overview – a report on the 2011 General Lifestyle Survey
5. Eurobarometer. Attitudes towards Alcohol. 2007. European Commission
6. Office for National Statistics. Alcohol-related deaths in the UK: registered in 2015
7. Holahan CJ, Schutte KK, Brennan PL, Holahan CK, Moos BS, et al. Late-Life Alcohol Consumption and 20-Year Mortality. *Alcoholism: Clinical and Experimental Research*. 2010. 34: 1961–1971
8. Ayers B, Myers LB. Do media messages change people's risk perceptions for binge drinking? *Alcohol Alcohol*. 2012; 47(1): 52-6
9. Moreno MA, Furtner F, Rivara FP. Media influence on adolescent alcohol use. *Arch Pediatr Adolesc Med*. 2011; 165(7): 680
10. Koordeman R, Kuntsche E, Anschutz DJ, van Baaren RB, Engels RC. Do we act upon what we see? Direct effects of alcohol cues in movies on young adults' alcohol drinking. *Alcohol Alcohol*. 2011; 46(4): 393-8
11. Koordeman R, Anschutz DJ, Engels RC. Exposure to alcohol commercials in movie theaters affects actual alcohol consumption in young adult high weekly drinkers: an experimental study. *Am J Addict*. 2011; 20(3): 285-91
12. Scott S, Muirhead C, Shucksmith J, Tyrrell R, Kaner E. Does industry-driven alcohol marketing influence adolescent drinking behaviour? A systematic review. *Alcohol and alcoholism*. 2016 Nov 18
13. Jernigan D, Noel J, Landon J, Thornton N, Lobstein T. Alcohol marketing and youth alcohol consumption: a systematic review of longitudinal studies published since 2008. *Addiction*. 2016 Jan 1
14. Stern S, Morr L. Portrayals of teen smoking, drinking, and drug use in recent popular movies. *J Health Commun*. 2013; 18(2): 179-91
15. Bergamini E, Demidenko E, Sargent JD. Trends in tobacco and alcohol brand placements in popular US movies, 1996 through 2009. *Jama, Pediatr*. 2013; 167(7): 634-9
16. van Hoof JJ, de Jong MD, Fennis BM, Gosselt JF. There's alcohol in my soap: portrayal and effects of alcohol use in a popular television series. *Health Educ Res*. 2009; 24(3): 421-9
17. Cranwell J, Murray R, Lewis S, Leonardi-Bee J, Dockrell M. and Britton J. Adolescents' exposure to tobacco and alcohol content in YouTube music videos. *Addiction*. 2015. 110(4), pp.703-711
18. Peel NM, McClure RJ, Bartlett HP. Behavioral determinants of healthy aging. *American journal of preventive medicine*. 2005; 28(3): 298-304

19. Khaw K-T, Wareham N, Bingham S, Welch A, Luben R, Day N. Combined impact of health behaviours and mortality in men and women: the EPIC-Norfolk prospective population study. *Obstetrical and Gynecological Survey*. 2008; 63(6): 376-7
20. Fried LP, Carlson MC, Freedman MM, Frick KD, Glass TA, Hill MJ, et al. A social model for health promotion for an aging population: initial evidence on the Experience Corps model. *Journal of Urban Health*. 2004; 81(1): 64-78
21. James AR, Chris M. Baby boomers and busters: an exploratory investigation of attitudes toward marketing, advertising and consumerism. *Journal of Consumer Marketing*. 2000; 17(6): 481-97
22. Immersion Active. 50+ Facts and Fiction: Size, Wealth and Spending of 50+ Consumers Maryland, USA.2015 [cited 2015 19th August]. Available from: <http://www.immersionactive.com/resources/size-wealth-spending-50-consumers/>
23. Donatelli NS, Simes J. Alcohol and Aging: The Invisible Epidemic. *Journal of Emergency Nursing*. 2014; 40(2): 177-80
24. Daykin N, Irwin R, Kimberlee R, Orme J, Plant M, McCarron L, et al. Alcohol, young people and the media: a study of radio output in six radio stations in England. *J Public Health (Oxf)*. 2009; 31(1): 105-12
25. Radio Joint Audience Research. 2014
26. Minitab Inc. Minitab 17.1.0. 2013
27. Riff D, Lacy S, Fico F. *Analyzing media messages: Using quantitative content analysis in research*: Routledge; 2014
28. Graham A, Adams J. Alcohol Marketing in Televised English Professional Football: A Frequency Analysis *Alcohol Alcohol*. 2014; 49(3): 343-8
29. IBM Corp. *IBM SPSS Statistics for Windows, Version 22.0*. Armonk, NY: IBM Corp.; 2013
30. Krippendorff K. Reliability in content analysis. *Human Communication Research*. 2004; 30(3): 411-33
31. Krippendorff K. Computing Krippendorff's alpha reliability. *Departmental papers (ASC)*. 2007: 43
32. Anderson P, De Bruijn A, Angus K, Gordon R, Hastings G. Impact of alcohol advertising and media exposure on adolescent alcohol use: a systematic review of longitudinal studies. *Alcohol and alcoholism*. 2009; 44(3): 229-43
33. Koordeman R, Anschutz DJ, Engels RC. Alcohol portrayals in movies, music videos and soap operas and alcohol use of young people: current status and future challenges. *Alcohol Alcohol*. 2012; 47(5): 612-23
34. Stautz K, Brown KG, King SE, et al. Immediate effects of alcohol marketing communications and media portrayals on consumption and cognition: a systematic review and meta-analysis of experimental studies. *BMC Public Health* 2016 16:1–18
35. Sutherland M, Sylvester AK. *Advertising and the mind of the consumer: what works, what doesn't, and why*. 3rd ed. Australia: Allen & Unwin; 2008

36. Bennetts R. IAS Briefing Paper: Use of Alcohol As A Loss-Leader. St Ives, Institute of Alcohol Studies. 2008

37. Gilmore IT. Calling time for implementation of the English alcohol harm reduction strategy. *Addiction*. 2004; 99(12): 1487-8

Table 1: Description of the radio stations selected for analysis, including population reach and the ratio of average hours for listeners in the 55-64 age group to average hours for all adult listeners

<i>Station</i>	<i>Geographic area</i>	<i>Population reach</i>	<i>Ratio*</i>	<i>Genre</i>
<i>Capital Birmingham</i>	West Midlands	440,000	3.3	Pop & current chart
<i>Downtown Radio</i>	Northern Ireland	269,000	2.0	Adult contemporary**
<i>XFM</i>	Greater London	417,000	4.0	Alternative, indie & rock
<i>BBC Radio 2</i>	UK (national)	15,014,000	1.0	Adult contemporary**

* - average hours for each station in the 55-64 age group to the average hours for all adult listeners

* - typically 60s, 70s, 80s, 90s and current pop and chart music

Table 2: Count of all references, mean number (SD) of references to alcohol per hour and mean (SD) reference length, by station and time point

<i>Station</i>	<i>December 2014</i>			<i>February 2015</i>			<i>April 2015</i>		
	<i>n</i>	<i>Per hour</i>	<i>Length*</i>	<i>n</i>	<i>Per hour</i>	<i>Length</i>	<i>n</i>	<i>Per hour</i>	<i>Length</i>
<i>Cap. B'ham</i>	26	2.9 (2.0)	27.2 (9.3)	3	0.3 (0.5)	26.3 (11.0)	10	1.2 (1.0)	25.0 (5.3)
<i>Downtown</i>	28	3.2 (2.5)	21.5 (5.6)	4	0.4 (1.0)	20.0 (0.0)	12	1.3 (1.4)	20.8 (2.9)
<i>XFM</i>	16	1.8 (1.1)	24.3 (7.6)	3	0.3 (0.5)	19.0 (11.5)	0	0.0 (0.0)	0.0 (0.0)
<i>BBC R2</i>	23	2.6 (2.2)	11.1 (9.3)	3	0.7 (1.0)	17.7 (12.5)	23	2.5 (3.4)	33.0 (43.5)
<i>Overall</i>	93	2.6 (4.5)	21.0 (10.0)	13	0.4 (0.9)	20.7 (8.7)	45	1.3 (2.4)	28.0 (31.3)

* - length is in seconds

Table 3: Type of mentions - brand specific, type specific or other general/indirect mentions

Type	Commercial (n=102*)	BBC (n=49)
<i>Direct mention – brand or type specific</i>	n (%)	n (%)
<i>Wine</i>	38 (37.3)	14 (28.6)
<i>Beer/lager/cider</i>	16 (15.7)	12 (24.5)
<i>Spirits or cocktails</i>	13 (12.7)	5 (10.2)
<i>Multiple products</i>	1 (1.0)	1 (2.0)
<i>Alcohol in general – general drinking</i>	8 (7.8)	6 (12.2)
<i>Alcohol in general – drunkenness</i>	3 (2.9)	6 (12.2)
<i>Alcohol in general – implications/consequences</i>	7 (6.9)	2 (4.1)
<i>Counter-advertising (or responsible drinking)</i>	10 (9.8)	0 (0.0)
<i>Encouraging responsible consumption</i>	8 (7.8)	0 (0.0)
<i>Alcohol for use as other than a drink</i>	0 (0.0)	3 (6.1)

* - two mentions were given two sub-type codes (as per protocol) and so are double counted, hence column total is 104

Table 4: Count (%) of number of adverts for the three commercial stations, broken down by type of advert and pooled across time points

	<i>Capital Birmingham (n=36)</i>	<i>Downtown Radio (n=43)</i>	<i>XFM (n=13)</i>	<i>Total</i>
<i>Advert by supermarket for specific brand(s)</i>	11 (30.6)	28 (65.1)	10 (76.9)	49 (53.3)
<i>Advert by supermarket for own brand</i>	1 (2.8)	0 (0.0)	0 (0.0)	1 (1.1)
<i>Advert by supermarket for alcohol in general (no brand)</i>	4 (11.1)	7 (16.3)	0 (0.0)	11 (12.0)
<i>Counter-advertising/sensible drinking</i>	8 (22.2)	4 (9.3)	3 (23.1)	15 (16.3)
<i>Advert for a bar/pub/restaurant</i>	8 (22.2)	0 (0.0)	0 (0.0)	8 (8.7)
<i>Other advertising that mentions alcohol</i>	4 (11.1)	4 (9.3)	0 (0.0)	8 (8.7)

Table 5: Total minutes of alcohol advertising, also shown as a percentage of all advertising time.

Shown by time point; data pooled across all stations.

	<i>December 2014</i>	<i>February 2015</i>	<i>April 2015</i>	<i>Overall</i>
<i>Advert by supermarket for specific brand(s)</i>	9.7 (3.3)	2.3 (0.9)	5.0 (2.9)	17.0 (2.1)
<i>Advert by supermarket for own brand</i>	0.3 (0.1)	0.0 (0.0)	0.0 (0.0)	0.3 (0.03)
<i>Advert by supermarket for alcohol in general (no brand)</i>	2.7 (0.9)	0.0 (0.0)	1.0 (0.4)	3.7 (0.5)
<i>Counter-advertising/sensible drinking</i>	8.1 (2.8)	0.0 (0.0)	0.0 (0.0)	8.1 (1.0)
<i>Advert for a bar/pub/restaurant</i>	2.0 (0.7)	0.0 (0.0)	1.8 (0.7)	3.8 (0.5)
<i>Other advertising that mentions alcohol</i>	3.5 (1.2)	0.0 (0.0)	0.5 (0.2)	4.0 (0.5)
<i>All advertising that mentions alcohol</i>	26.3 (9.8)	2.3 (1.3)	8.3 (3.3)	36.9 (5.0)

Supplementary data 1: Count (%) of drinking prompts mentioned or implied

<i>Location</i>	<i>Commercial (n=107)</i>	<i>BBC Radio 2 (n=52)</i>	<i>All (n=159)</i>
<i>To alleviate negative emotions</i>	0 (0.0)	1 (1.9)	1 (0.6)
<i>Peer pressure</i>	1 (0.9)	1 (1.9)	2 (1.9)
<i>Belong to a group</i>	2 (1.9)	1 (1.9)	3 (3.8)
<i>To socialise</i>	29 (27.1)	1 (1.9)	30 (18.9)
<i>To enhance an experience</i>	5 (4.7)	8 (16.7)	13 (8.2)
<i>To celebrate</i>	45 (42.1)	4 (8.3)	49 (30.8)
<i>For its own sake</i>	12 (11.2)	11 (21.2)	23 (14.5)
<i>For health benefits</i>	2 (1.9)	0 (0.0)	2 (1.3)
<i>No intake prompts</i>	11 (10.3)	25 (48.1)	36 (22.6)

Supplementary data 2: Count (%) of consumption type mentioned or implied

<i>Location</i>	<i>Commercial</i> <i>(n=102)</i>	<i>BBC Radio 2</i> <i>(n=49)</i>	<i>All</i> <i>(n=149)</i>
<i>Binge/drinking to get drunk</i>	10 (9.8)	3 (6.7)	13 (8.6)
<i>Slow/moderate consumption</i>	5 (4.9)	4 (8.9)	9 (6.0)
<i>Consuming specifically with food</i>	8 (7.8)	8 (16.3)	16 (10.6)
<i>Counter-advertising/responsible drinking</i>	10 (9.8)	0 (0.0)	10 (6.6)
<i>Negative effects of drinking</i>	2 (2.0)	1 (2.0)	3 (2.0)
<i>Not enough information given</i>	67 (65.7)	33 (66.7)	100 (66.2)

Supplementary data 3: Count (%) of all socio-cultural associations with references to alcohol

<i>Type</i>	<i>Commercial</i> (n=182)	<i>BBC</i> (n=86)	<i>All</i> (n=268)
<i>Sexual desire/success</i>	1 (0.5)	0 (0.0)	1 (0.4)
<i>Reward/success</i>	10 (5.5)	4 (4.7)	14 (5.2)
<i>Relaxation</i>	6 (3.3)	4 (4.7)	10 (3.7)
<i>Social status</i>	9 (4.9)	7 (8.1)	16 (6.0)
<i>Creative expression</i>	0 (0.0)	4 (4.7)	4 (1.5)
<i>Humour</i>	23 (12.6)	15 (17.4)	38 (14.2)
<i>Good taste/artisanal</i>	13 (7.1)	10 (11.6)	23 (8.6)
<i>Glamorousness</i>	11 (6.0)	1 (1.2)	12 (4.5)
<i>Emotional disconnection</i>	0 (0.0)	1 (1.2)	1 (0.4)
<i>Empathy/bonding</i>	3 (1.6)	1 (1.2)	4 (1.5)
<i>Sport-related</i>	1 (0.5)	1 (1.2)	2 (0.8)
<i>Alcohol as a gift</i>	19 (10.4)	3 (3.5)	22 (8.2)
<i>Alcohol as a staple/necessity/norm</i>	44 (24.2)	25 (29.1)	69 (25.8)
<i>Nutritional/health benefit</i>	2 (1.1)	1 (1.2)	3 (1.1)
<i>Shame/embarrassment</i>	11 (6.0)	2 (2.3)	13 (4.9)
<i>Legal implications</i>	1 (0.5)	1 (1.2)	2 (0.8)
<i>Detrimental health impacts</i>	2 (1.1)	0 (0.0)	2 (0.8)
<i>Other negative outcomes</i>	7 (3.8)	1 (1.2)	8 (3.0)
<i>Benefits of responsible drinking</i>	14 (7.7)	1 (1.2)	15 (5.6)
<i>Forgetfulness</i>	0 (0.0)	2 (2.3)	2 (0.8)
<i>Silly behaviour</i>	1 (0.5)	2 (2.3)	3 (1.1)
<i>Impaired performance</i>	4 (2.2)	0 (0.0)	4 (1.5)

Figure 1: Frequency distribution of the show segments in which references to alcohol were made, split between commercial and non-commercial station; data pooled across all time points

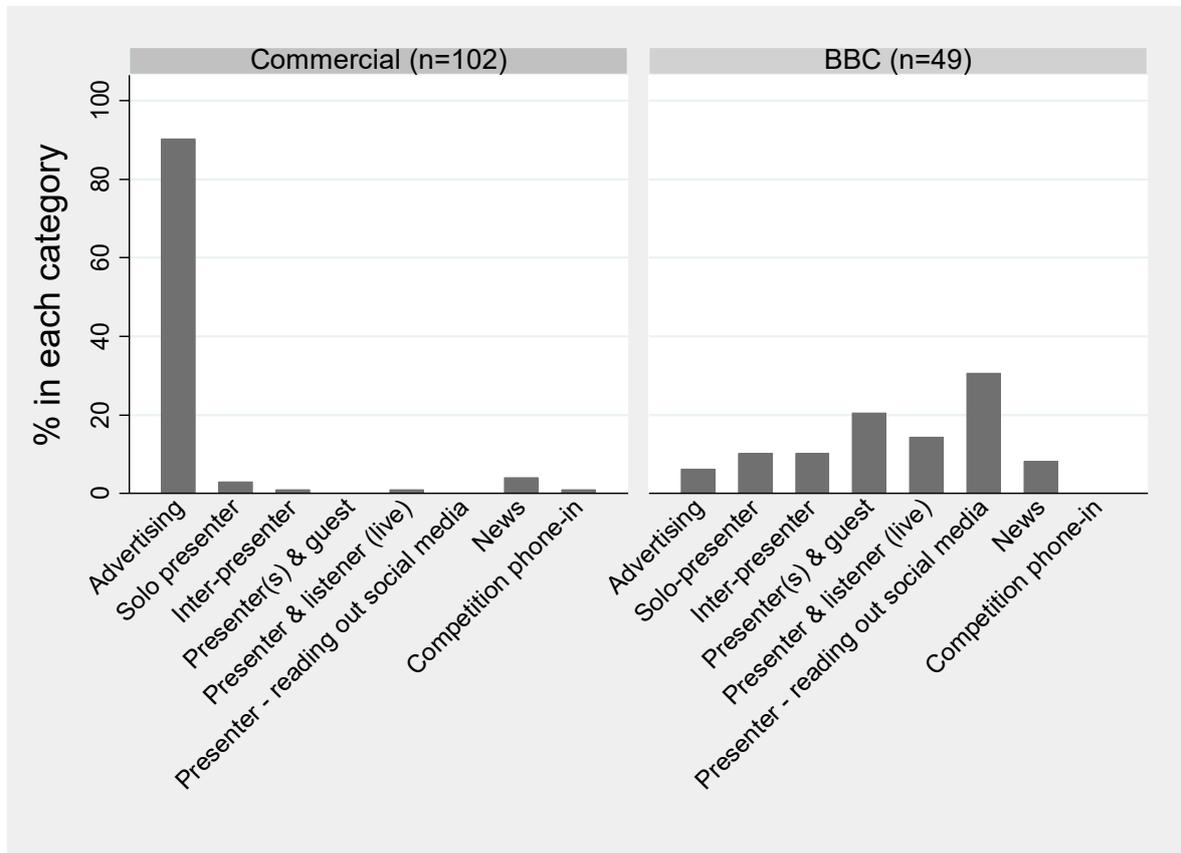


Figure 2: Frequency of adverts by individual supermarkets, wine shops or convenience stores

