

■ Academic Paper

Do time restrictions on alcohol advertising reduce youth exposure?

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Regulators may attempt to reduce youth exposure to alcohol advertising by restricting times during which alcohol ads may be aired on television or radio. The Netherlands introduced such a policy and found that teenage advertising exposure increased following the time restrictions. This study uses simulation analysis and a comprehensive database of television alcohol advertising to demonstrate that time restrictions are likely to reduce advertising exposure to the youngest viewers while increasing exposure for the high-risk teenage population. Copyright © 2012 John Wiley & Sons, Ltd.

BACKGROUND

Alcohol is the drug most frequently used and abused by adolescents in the USA and in the Netherlands. In the USA, 56% of students aged 15 and 16 years reported using alcohol and 34% reported having been drunk in the past year (Hibell *et al.*, 2007). Comparable numbers for the Netherlands were 84% and 36% (Hibell *et al.*, 2007). Consequences of underage drinking include higher rates of violence and personal injury (Hingson & Zha, 2009), unwanted pregnancies and risky sexual behavior (Hingson *et al.*, 2003), and lifetime alcohol abuse and dependence (Grant & Dawson, 1997).

Adolescent exposure to alcohol advertising and promotion has been associated with earlier drinking initiation and more frequent alcohol consumption in longitudinal studies (Anderson *et al.*, 2009). In controlled experiments, exposure to alcohol imagery in movies and alcohol commercials has led to increased drinking volume (Engels *et al.*, 2009; Koordeman *et al.*, 2011). Both public health officials and trade representatives of the alcohol industry agree that it is desirable to minimize adolescent exposure to alcohol advertising. In the USA, youth see approximately one alcohol advertisement per day (Center on Alcohol Marketing and Youth, 2010). The Beer

Institute (2011), the Distilled Spirits Council (2011), and the Wine Institute (2011) (trade associations for each respective beverage type) voluntarily have proposed to restrict their advertising to media in which adults (aged 21 years or older) comprise 71.6% of the audience for the media—a number proportional to the size of the legal-age adult population in the USA. However, despite relatively high levels of compliance with these voluntary standards on television in the USA, youth exposure to alcohol advertising has grown faster than adult exposure on TV (Center on Alcohol Marketing and Youth, 2010).

Similar voluntary advertising restrictions are in place for alcohol advertisers in the Netherlands where youth are exposed to alcohol advertisements on television approximately every other day (van den Wildenberg & van den Broeck, 2011). In the Netherlands, advertisers are voluntarily restricted to programming with a youth audience composition of no more than 25% (van den Wildenberg & van den Broeck, 2011). Compliance with these self-regulatory standards in the Netherlands has also been high, with only 3.6% of ads violating this threshold based on a sample taken in 2010 (van den Wildenberg & van den Broeck, 2011). Even so, regulators in the Netherlands implemented a time restriction for alcohol advertising in 2009 (van den Wildenberg, 2011). Under this restriction, alcohol advertising was prohibited on television and radio between the hours of 6 AM and 9 PM effective 1 January 2009, with advertisers given 12 months

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to achieve full compliance. In 2010, compliance with the time restriction on television was 98.5% (van den Wildenberg, 2011). Yet, despite high compliance with the time restriction, youth exposure to alcohol advertising in the Netherlands grew faster than adult exposure between 2007 and 2010 (van den Wildenberg, 2011). Most recently, Ireland announced intentions to implement a time restriction for alcohol advertising (Culliton, 2012). In light of experience in the Netherlands and the recommendations for new regulations in Ireland, insight regarding the impact of a time restriction on alcohol advertiser behavior and resulting youth exposure is a critical public health priority.

In this analysis, we set out to determine if time restrictions on alcohol advertising reduce youth exposure to alcohol ads by creating a comprehensive simulation model using advertising data from the USA and validating this model using data from an actual time restriction policy implemented in the Netherlands.

METHODS

Data sources

To develop the simulation model, we used data from the Center on Alcohol Marketing and Youth at Johns Hopkins Bloomberg School of Public Health—the most comprehensive alcohol advertising database in the world that is available to public health researchers. Data on alcohol advertisements appearing on television in the USA in 2010 were licensed from Nielsen (New York, NY) and accessed using Nielsen's Monitor-Plus™ system. For each advertising occurrence, Monitor-Plus™ provided information about the date, time, network, program title, program type, advertising brand, and audience information for all viewers aged 2–20 years (referred to in this study as 'underage'), 12–20 years (referred to in this study as 'youth'), and aged 21–34 years (referred to as 'young adults'). Adolescent (aged 12–17 years) and all adult (aged 18 years and older) exposure to television advertising on all broadcast networks and a sample of cable networks in the Netherlands was sourced from Nielsen for a period of 4 weeks (1 week per quarter) for 2007 and 2008 and Stichting Kijkonderzoek for the same 4 weeks (1 week per quarter) for 2009, and 2010 (van den Wildenberg, 2011). Although two different data sources were used for this data, previous research has cross-validated these sources (van den Wildenberg, 2011).

Measures

Audience information was measured using program ratings, which are the per cent of the television audience reached by a given advertisement, calculated by dividing the number of viewers in a given age range

by the total television population for that age range (note that advertisers use the television population as opposed to census population for these calculations). Audience information from both countries was the 'Live+7' rating for the program in which the ad was placed, where 'Live+7' is the live audience for the program plus 7 days of playback on a recording device such as a VCR/DVR. The sum of ratings across multiple programs is referred to as gross rating points (GRPs), which represent the total per-capita advertising exposure of a given population to a complete advertising schedule of ads running on multiple programs over a given period.

Simulation of advertiser behavior following a time restriction

We simulated the shifting of advertising from times prohibited under a time restriction to later times when the advertising would be permitted. We conducted two separate analyses: one for 'non-live' programming (pre-recorded programs that were repeated during both daytime and evening hours) and another for 'live' programming such as telecasts of sporting events. Effectively, these two analyses model separate impacts of the time restriction for broadcast network television versus cable television. Most alcohol advertisements on broadcast network television in the USA (74% of exposure on broadcast television for young adults aged 21–34 years) appeared on 'live' programming, such as sporting events or award programs such as The Academy Awards. By contrast, most alcohol advertisements on cable network television (84% of exposure on cable television for adults aged 21–34 years) appeared on 'non-live' or 'pre-recorded' programs that were repeated multiple times throughout the day.

Simulation analysis for 'non-live' programming on cable television

We simulated an advertiser's likely response to a time restriction by moving alcohol ads appearing before the time restriction to the same or similar programs that aired after the time restriction. Ads that appeared on programs prior to the restriction were marked to be moved, and the programs on which alcohol ads appeared after the time restriction became the candidate programs to which the ads might be moved. Advertisers select programs for advertising primarily on the basis of the viewing audience for the program. If they are forced to remove an ad from a program due to a time restriction, they are likely to seek a similar program in the permitted period.

To simulate the movement of advertisements to similar programs, we created a ratings category for each ad on the basis of the size of the aged 21–34 years audience using nine ratings categories (0.00–0.329, 0.33–0.659, . . . , 3.00 or higher). These ratings categories

were selected because most cable television programs had very small audiences and the use of larger categories such as quartiles would not have provided reasonable differences between the lower quartiles. These ratings categories created a distribution of programs with varied ratings with a reasonable sample of programs in each category. In addition, Nielsen classifies each program into a program type. We aggregated the Nielsen program types into the following eight groups: Instructions-Advice, Documentary, Drama, Film, Sitcom, Variety, Sports Commentary, and Other.

Working with one brand at a time, we moved each alcohol ad that appeared prior to the time threshold to a comparable program with similar adult audience size (based on ratings category) that appeared after the time threshold. We created a number of simulation rules to model the manner in which advertisers would find comparable programs. We searched for comparable programs after the time restriction using the following rules in order: (Rule 1) the same *program title* on the *same network* on the *same date* with comparable ratings; (Rule 2) the same *program title* on the *same network* during the *same month* with comparable ratings; (Rule 3) the same *program type* on the *same network* on the *same date* with comparable ratings; (Rule 4) the same *program type* on the *same network* during the *same month* with comparable ratings; or (Rule 5) the same *program type* on *any network* during the *same month* with comparable ratings. If we could not find a match using Rules 1–5, we searched in sequentially lower ratings categories until a match was found (Rule 6). We randomly selected one matching program on which to place the ad from among the available matched programs, keeping track of which matching criterion (Rules 1–6) was utilized. We repeated this process for each advertisement placed by a brand prior to the time threshold until we had moved all ads, or until we had matched the young adult exposure in GRPs from ads placed before the time threshold with ads placed after the threshold because young adults are often the audience most sought after by alcohol advertisers (Reill, 2002; Theodore, 2001; Zimoch, 2002). To restrict the number of ads placed by a brand on any given television program, we limited the total number of ads placed on a program to the maximum number of alcohol ads placed on a program in each of the eight program types. For each brand, we tracked the number of ads, underage youth exposure, youth exposure, and young adult exposure before and after the movement of ads.

We calculated per cent change in number of ads, underage exposure, youth exposure, and young adult exposure by summing the results for all brands and averaging these sums across all simulations. We repeated simulations until the mean change in youth

exposure stabilized at the third decimal point (0.001). We analyzed three different time restrictions: 9, 10, and 11 PM. All simulations were run in custom-coded software written in Microsoft Visual Basic (VB.NET 2010, Microsoft Corporation, Redmond, WA) that integrated with the alcohol advertising database of The Center on Alcohol Marketing and Youth at Johns Hopkins University (an SQL*SERVER 2008 database, Microsoft Corporation).

Analysis of advertising on 'live' programming

Live programs, such as sporting events, present different challenges to an advertiser if the program is not available for advertising because of a time restriction. It is not possible to move the ad to the same or similar program at a later time because the live program is not available at that later time. Therefore, our analysis assumed that advertisers would randomly pick programs after the time restriction to make up for the ads moved because of the time restriction. We used average ratios of youth to young adult exposure for periods after the time threshold. We calculated the expected youth exposure after the time threshold by multiplying young adult exposure from before the time threshold by the youth/young adult exposure ratio in the new period after the threshold (Equation (1)).

$$\text{Youth Exposure}_{\text{After}} = \text{Young Adult Exposure}_{\text{Before}} * \frac{\text{Youth Exposure}_{\text{After}}}{\text{Young Adult Exposure}_{\text{After}}} \quad (1)$$

We then calculated the per cent change in youth exposure. Because most alcohol advertising on 'live' programming occurs during sporting events and awards programs such as The Academy Awards, we restricted this analysis to those program types.

Comparison of US simulation results with results in the Netherlands

We examined the simulated change in underage and youth advertising exposure for both the USA and the Netherlands. The projected change in exposure for US advertising was calculated from the simulation analyses. To adjust for the overall increase in alcohol advertising exposure following implementation of the advertising time restriction, we subtracted the per cent change in youth exposure (aged 12–17 years) from the per cent change in adult exposure (aged 18 years and older), treating the change in adult exposure as the baseline. We repeated this process for children aged 6–11 years.

RESULTS

Simulation analysis of 'non-live' cable programming

Using the US data, we found that 81 brands had ads on television prior to the 9 PM time threshold, 83 brands prior to the 10 PM threshold, and 86 brands prior to the 11 PM threshold. The total number of ads that needed to be shifted was 63 818, 74 166, and 84 412 for the 9, 10, and 11 PM thresholds, respectively. We found that the simulations stabilized between 38 and 49 runs and therefore standardized the analysis on 50 runs. With the 9 PM threshold, the simulation matched ads 34% of the time using Rule 1 and 31%, 23%, 10%, 2%, and 0% for Rules 2–6, respectively. These percentages did not change significantly for the 10 and 11 PM thresholds.

Simulation results are presented in Table 1. For each time restriction, the young adult exposure is unchanged by design. The time restriction appears to be effective in reducing exposure to alcohol advertising for underage viewers, with average reductions of 4.0%, 6.7%, and 9.8% for restrictions at 9, 10, and 11 PM, respectively. However, advertising exposure for youth aged 12–20 years, the age group at highest risk of initiating alcohol use (Donovan, 2004), actually increased by 4.4% and 2.5% for the 9 and 10 PM thresholds, respectively. Youth exposure declined by 0.2% with the 11 PM time threshold, not a meaningful difference given simulation runs ranging from –0.4% to 0.1%.

Youth increase as a percentage of the nighttime television audience because the proportion of youngest underage viewers in the television audience (aged 2–11 years) declines after 9 PM (Figure 1). Therefore, the time restriction is acting to increase exposure to youth aged 12–20 years, while appearing to reduce overall underage exposure.

Impact of time restriction on advertising on 'live' programming

For 'live' programming such as sporting events that occur during the day, advertisers would be required to purchase ads on programming after the time threshold that delivered an equivalent amount of young adult exposure. The proportion of youth in the television audience during the day is less concentrated than later in the evening. Thus, we would expect youth exposure to increase as advertisers move these ads into nighttime programs. As shown in Table 2, youth exposure increases by 15% if advertising is moved from programs telecast at 1 PM to programs telecast after 9 PM. Similar increases in youth exposure are shown for all ads telecast during the day.

Youth are particularly concentrated in the television viewing audience at the hour of 7 PM with a ratio of young adults to youth exposure of 0.64 compared with the 9 PM threshold ratio of 0.62. Thus, we see an anomalous decrease in exposure

Table 1 Results of simulation of three time restrictions showing change in number of ads, young adult advertising exposure, underage advertising exposure, and youth advertising exposure in the USA

	Threshold at 9 PM	Threshold at 10 PM	Threshold at 11 PM
Ads			
Before implementing restriction	63 818	74 166	84 812
After time restriction (range)	62 085 (61 896, 62 276)	73 780 (73 506, 73 972)	89 066 (88 811, 89 345)
Per cent change (range)	–2.7% (–3.0%, –2.4%)	–0.5% (–0.9%, –0.3%)	5.0% (4.7%, 5.3%)
Young adult exposure* (aged 21–34 years GRPs)			
Before implementing restriction	12 717	15 722	19 365
After time restriction (range)	12 809 (12 802, 12 818)	15 825 (15 813, 15 833)	19 473 (19 461, 19 487)
Per cent change (range)	0.7% (0.7%, 0.8%)	0.7% (0.6%, 0.7%)	0.6% (0.5%, 0.6%)
Underage exposure* (aged 2–20 years GRPs)			
Before implementing restriction	6873	8451	10 045
After time restriction (range)	6599 (6582, 6625)	7886 (7851, 7906)	9062 (9044, 9089)
Per cent change (range)	–4.0% (–4.2%, –3.6%)	–6.7% (–7.1%, –6.5%)	–9.8% (–10.0%, –9.5%)
Youth exposure* (aged 12–20 years GRPs)			
Before implementing restriction	9621	11 715	13 963
After time restriction (range)	10 046 (10 014, 10 081)	12 003 (11 963, 12 029)	13 939 (13 901, 13 977)
Per cent change (range)	4.4% (4.1%, 4.8%)	2.5% (2.1%, 2.7%)	–0.2% (–0.4%, 0.1%)

*Exposure is measured in gross rating points (GRPs), which are per-capita advertising exposure measures calculated by dividing the total number of advertising impressions by the television viewing population and multiplying by 100. Ratings and other data contained herein are the copyrighted property of Nielsen. Unauthorized use of this copyrighted material is expressly prohibited. Violators may be subject to criminal and civil penalties under Federal Law (17 USC 101 *et seq.*). All rights reserved.

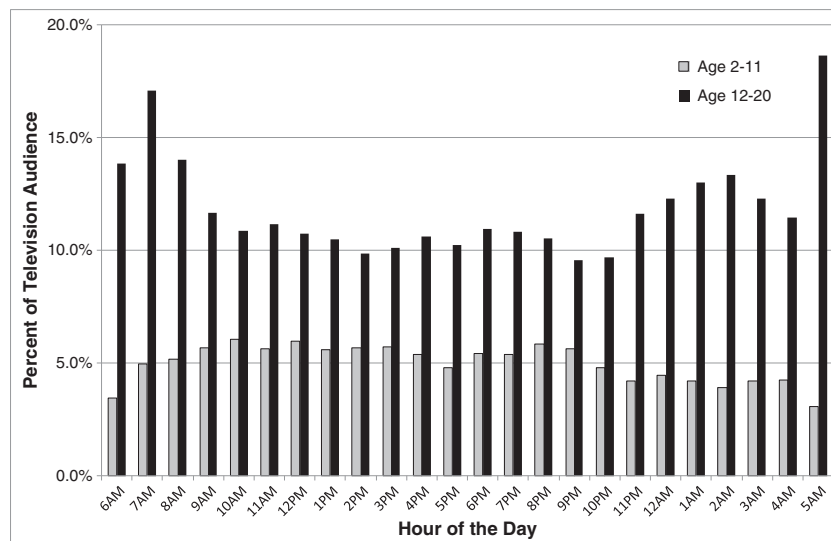


Figure 1 Proportion of underage youth in television audience at different hours in the USA. Ratings and other data contained herein are the copyrighted property of Nielsen. Unauthorized use of this copyrighted material is expressly prohibited. Violators may be subject to criminal and civil penalties under federal law (17 USC 101 *et seq.*). All rights reserved.

Table 2 Change in youth alcohol advertising exposure as a result of moving alcohol ads from daytime and evening 'live' programming in the USA

Live programs starting at hour (PM)	Change in youth exposure resulting from time threshold		
	9 PM (%)	10 PM (%)	11 PM (%)
1	15	13	19
2	13	11	16
3	12	10	15
4	13	11	16
5	12	10	15
6	8	6	11
7	-4	-5	-1
8	2	1	6

Youth exposure is measured in gross rating points (GRPs) for ages 12–20 years. GRPs are per-capita advertising exposure measures calculated by dividing the total number of advertising impressions by the television viewing population and multiplying by 100. Ratings and other data contained herein are the copyrighted property of Nielsen. Unauthorized use of this copyrighted material is expressly prohibited. Violators may be subject to criminal and civil penalties under federal law (17 USC 101 *et seq.*). All rights reserved.

for advertising moved from this 1 hour in the early evening.

With the exception of the 7 PM anomaly, any shifting of advertising from live award ceremonies and or sporting events airing during the day resulted in an increase in youth exposure after the time restriction. Thus, the time restriction policy appears to have a detrimental effect on youth exposure for live programming as well.

Comparison of simulation results with data from the Netherlands

After the introduction of the 9 PM time restriction in the Netherlands, the number of alcohol commercials after 9 PM more than tripled from 2007 to 2010, growing from 7692 commercials to 23 411 (van den Wildenberg, 2011). Adult advertising exposure (aged 18 years and older) grew by 57.3%, which was established as our baseline for advertising growth (Table 3). Adolescent exposure (aged 12–17 years) grew by

Table 3 Change in alcohol advertising exposure following a 9 PM time restriction in the Netherlands

Age (years)	Exposure* to alcohol advertising (GRPs [†])			
	2007	2010	Change 2007–2010 (%)	Change 2007–2010 net of change in adult (aged 18 years and older) exposure (%)
6–11	754	795	5.4	-51.9
12–17	1383	2236	61.7	4.4
18 and older	2383	3749	57.3	—

*Sample of advertising from weeks 11, 24, 37, and 50 from years 2007 and 2010

[†]GRPs are per-capita advertising exposure measures calculated by dividing the total number of advertising impressions by the television viewing population and multiplying by 100.

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61.7% during this same period (van den Wildenberg, 2011), a rate 4.4% faster than the growth in adult exposure. Advertising exposure of children aged 6–11 years (the youngest ages measured in the Netherlands) grew by only 5.4% during this period, a rate 51.9% slower than the growth in adult exposure. These findings are directionally consistent with the US simulation results with an increase in youth exposure occurring simultaneously with a decrease in exposure among the youngest ages.

DISCUSSION

Using US data, our simulation model showed that the time restriction resulted in an increase in the amount of alcohol advertising placed in nighttime programming during which the adolescent/teenage audience is more highly concentrated, increasing advertising exposure for this high-risk group. Our simulation was consistent with the increase in youth exposure that occurred after implementation of an actual time restriction in the Netherlands in 2009. The time restriction was effective at decreasing exposure to alcohol advertising for the youngest children, but this was at the expense of an increase in exposure among adolescent/teenage viewers. Both the 9 and 10 PM time restrictions increased adolescent exposure to alcohol advertising, whereas the 11 PM time restriction left youth exposure unchanged.

The Oireachtas Joint Committee on Health in Ireland has recently issued a report recommending a 9 PM time restriction for alcohol advertising (Culliton, 2012). In light of these findings, we would hope that this body, as well as other policy makers, would reconsider the concept of a time restriction as a mechanism to reduce youth exposure to alcohol advertising. At least in the USA, with growing numbers of adolescents having a television in their bedroom (Rideout *et al.*, 2010), forcing alcohol advertisers to move ads into late night programming is akin to inviting them to have a private conversation with adolescents every evening.

For countries such as the USA, where alcohol advertising is protected as commercial speech, policies that restrict alcohol advertising to programs where the youth audience (aged 12–20 years) is proportional to the US population may be more effective (Jernigan *et al.*, 2005). Such a policy, endorsed in the USA by the National Research Council, the Institute of Medicine, and 24 state attorneys general (National Research Council and Institute of Medicine, 2004; Shurtleff *et al.*, 2011), is more targeted on the high-risk adolescent population than the alcohol industry's current self-regulatory standard of 28.4% underage viewers, which has been demonstrated to allow overexposure of youth aged 12–20 years (Jernigan *et al.*, 2005). A proportional placement policy can reduce youth exposure while still allowing alcohol advertisers to reach legal age adults (Jernigan *et al.*,

2005). If the goal of reducing youth exposure is paramount, other countries may wish to consider more protective standards or complete bans on alcohol advertising on television, because of the difficulty in avoiding substantial youth audiences that our research has shown.

This study has several limitations. First, the comparison between the USA and the Netherlands poses several problems. Whereas television viewing in the USA is spread across several hundred channels, the selection of television channels in the Netherlands is more limited. Therefore, there may be fewer media channels on which to move advertising after a time restriction in the Netherlands relative to the USA. In addition, the countries have different legal drinking ages, and analyses comparing underage and legal age audiences between the two countries use different age groups. In light of these limitations, the results of the simulation analysis should be interpreted as directional. In addition, results from the Netherlands suggest that alcohol advertisers increase overall advertising volume in response to a time restriction. This analysis did not account for an increase in total advertising volume, focusing instead on shifting existing advertising. Therefore, our estimates may underestimate the total impact of the time restriction on youth exposure.

All parties in the policy discussion about youth exposure to alcohol advertising—alcohol companies, regulators, public health officials, and scientists—are in agreement that limiting youth exposure to alcohol advertising is an important goal. This research suggests that a time restriction is not an effective policy to achieve this goal.

BIOGRAPHICAL NOTES

Craig S. Ross is a PhD Candidate in Epidemiology at the Boston University School of Public Health and Principal Scientist at Virtual Media Resources, Inc., a media research consultancy specializing in the public health impacts of marketing and advertising. Since 2002, he has worked with The Center on Alcohol Marketing and Youth to monitor youth exposure to alcohol advertising in the USA. His dissertation research focuses on risk factors for adolescent drug use initiation.

Avalon De Bruijn is trained as a Sociologist and is working as a Researcher at The Dutch Institute for Alcohol Policy (STAP) and Radboud University in the Netherlands. She is the coordinator of the European Centre for Monitoring Alcohol Marketing (www.EUCAM.info), an NGO that promotes the monitoring of alcohol marketing and the dissemination of related research. She has been involved in several international projects on alcohol advertising that were co-funded by the European Commission. In 2010 she coordinated a project monitoring alcohol marketing in Africa as commissioned by the WHO Afro. Currently, she is coordinating an international PhD

project on the effects of alcohol advertising on drinking behavior of European adolescents.

David H. Jernigan PhD is Associate Professor in the Department of Health, Behavior and Society and Director of the Center on Alcohol Marketing and Youth at the Johns Hopkins Bloomberg School of Public Health. He also leads Hopkins teams of two collaborative research projects on youth alcohol brand preference and alcohol marketing exposure and on social and health effects of changes in alcohol pricing. He has advised the World Health Organization and the World Bank and co-authored WHO's 'Global status report on alcohol, media advocacy and public health: power for prevention, and alcohol in the developing world: a public health perspective'.

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