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The Impact of Alcohol Marketing on Youth Drinking Behaviour: A Two-stage Cohort Study

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Abstract

Aim To examine whether awareness of, and involvement with alcohol marketing at age 13 is predictive of initiation of drinking, frequency of drinking and units of alcohol consumed at age 15.

Methods A two-stage cohort study, involving a questionnaire survey, combining interview and self completion, was administered in respondents' homes. Respondents were drawn from secondary schools in three adjoining local authority areas in the West of Scotland (United Kingdom). From a baseline sample of 920 teenagers (aged 12-14, mean age 13), in 2006, a cohort of 552 was followed up two years later (aged 14-16, mean age 15). Data were gathered on multiple forms of alcohol marketing and measures of drinking initiation, frequency and consumption.

Results Logistic regression demonstrated that, after controlling for confounding variables, involvement with alcohol marketing at baseline was predictive of both uptake of drinking and increased frequency of drinking at follow-up. Awareness of marketing at baseline was also associated with increased frequency of drinking at follow-up.

Conclusions Our findings demonstrate an association between involvement with, and awareness of, alcohol marketing and drinking uptake or increased drinking frequency, and we consider whether the current regulatory environment affords youth sufficient protection from alcohol marketing.

Introduction

That many adolescents have used or do use alcohol is beyond doubt. In most countries within the European Union (EU) for instance more than 70% of youth (15-16 years) admit to drinking alcohol within the previous year, and over 50% within the past month. Further, in the United Kingdom (UK), levels of youth binge drinking and past-year and past-month drunkenness are considerably higher than in the rest of the EU (Hibell *et al.* 2009). So too are levels of consumption, which have almost doubled between 1990 and 2007 in England (Fuller, 2009). It is these hazardous youth drinking behaviours that represent a major public health concern given the possible injurious consequences (HM Government, 2007), including poor educational performance, risky sexual behaviour and teenage pregnancy (Newbury-Birch *et al.* 2009; OECD, 2009), crime and disorder (Hibell *et al.* 2009; Home Office, 2004) and a range of physical and psychological harms (HES, 2007; Scottish Government, 2010). Additionally, using alcohol at an earlier age is a predictor of future dependency (Bonomo *et al.* 2004; Newbury-Birch *et al.*, 2009).

Many protective and risk factors have been identified for youth drinking uptake and behaviour. Alcohol marketing has been suggested as one of these risk factors (Babor *et al.* 2003), with recent systematic reviews appearing to support this assertion (Smith and Foxcroft, 2009; Anderson *et al.* 2009b). This has led to some within the public health field calling for a complete ban on alcohol marketing, arguing that it is pervasive and linked with youth drinking initiation, consumption levels and continued drinking (BMA, 2009; Anderson, 2009; Godlee, 2009). A recent meta-review however, conducted in the UK on behalf of the Department for Children, Schools and Families, does not even consider marketing among the many risk factors identified (Newbury-Birch *et al.* 2009). Although this seems an important omission there is a paucity of research exploring the relationship

between alcohol marketing and youth drinking behaviour in Europe, and in the UK an absence of longitudinal research - a more powerful design that allows greater confidence when exploring potentially causal links (Prime Minister's Strategy Unit, 2004; Gunter *et al.* 2009). Highlighting this point, the Anderson *et al.* (2009b) systematic review of existing longitudinal research found that ten of the thirteen studies identified were from the US, one was from New Zealand and only two from Europe; in Belgium and Germany. The European Commission department concerned with health, DG SANCO, also acknowledged the lack of European studies, and in response to this has recently funded a multi-country EU study called the 'Amphora Project' (European Commission, 2009a) as well as the aforementioned German study (Hanewinkel and Sargent, 2008).

To address this gap in the literature we present findings from a UK cohort study. Funded as part of the National Preventive Research Initiative (NPRI) the study examines the cumulative impact of alcohol marketing communications on youth drinking during the period when most adolescents start experimenting with alcohol, from ages 13 to 15 (Black *et al.* 2009). In addition, and unlike most research in this area, we also examine non-traditional alcohol marketing channels such as new media, sponsorship and e-marketing.

Method

Design

Data comes from two waves of a cohort study called *Assessing the Cumulative Impact of Alcohol Marketing on Youth Drinking*. The baseline was conducted from October 2006 to March 2007 and the follow-up was conducted two years later, from October 2008 to March 2009. The study design was adapted from research on tobacco marketing in the UK (MacFadyen *et al.* 2001). Questionnaire development was informed by extensive formative

research and pre-testing (Gordon *et al.* 2010b). Cross sectional data from baseline are reported elsewhere (Gordon *et al.* 2011).

Setting and Sample

The study was conducted within three local authority areas in the West of Scotland. The baseline sample was recruited via an information pack (containing an information sheet, parental and respondent consent forms and offering a small gift token for participation) sent to the homes of all second year pupils (12-14 years, mean age 13) attending state secondary schools in each local authority area. In one local authority area the invitations were mailed to respondents' homes. In two local authorities, schools were asked to distribute the packs to pupils to take home. Of the 920 baseline respondents a cohort of 552 were followed up two years later when in fourth year (14-16 years, mean age 15).

Baseline characteristics of sample: The achieved cohort sample was evenly distributed by gender, 50% (n=275) male and 50% (n=277) female (Table 10.1a). Social grade, classified using the National Readership social grading system, was based upon the occupation of the chief income earner. Approximately two-fifths (41%, n=224) were ABC1 (middle class) and approximately three-fifths (59%, n=326) C2DE (working class) (Wilmshurst and MacKay, 1999), which is largely consistent with national (45.6% ABC1, 54.4% C2DE) census data (GROS, 2001). Sample ethnicity was predominantly white 94% (n=515), with 3% (n=19) identifying themselves as Asian, 1% mixed race (n=7), 1% black (n=6), <1% Chinese (n=1) and <1% other (n=1). For religious identification most of the sample were Christian 65% (n=354) or had no religiosity 31% (n=169), with 3% Muslim (n=19) and 1% other (n=5).

Baseline characteristics of cohort v drop-out sample: Compared with the cohort that was successfully followed up, the drop-out sample had a higher proportion of girls (50% girls in follow-up sample, 57% girls in sample lost to attrition, $p < 0.05$) and a higher proportion of middle class (ABC1) respondents (41% ABC1 in follow-up sample, 55% ABC1 in sample lost to attrition, $p < 0.001$). The cohort did not differ from the drop-out sample in terms of drinking status, age, ethnicity or religion.

Data Collection

Fieldwork comprised face-to-face interviews conducted in-home, by professional interviewers, with an accompanying self-completion questionnaire to gather sensitive data on drinking behaviour. Respondent confidentiality and anonymity of personal data was assured. Parental permission and participant consent were obtained prior to interview at each wave. Numbered show cards were used throughout the interviewer administered questionnaire to maximise privacy and enable respondents to answer freely without fear of conveying their answers to others who may be present in the room. Participants sealed their self-completion questionnaire in an envelope before handing it to the interviewer. Ethical approval was obtained from the University of Stirling Ethics Committee and interviewers adhered to the Market Research Society Code of Conduct (MRS, 2005).

Table: Baseline characteristics and description of dependent and independent variables included in logistic and multiple regression models

a) Baseline characteristics of independent variables				b) Logistic Regression Models 1 to 4				c) Logistic Regression Models 5 to 12				d) Multiple Regression Models 13 to 16				
		Number in Cohort (N=552)	Valid %	Mean (sd)	Model 1	Model 2	Model 3	Model 4	Model 5 and 9	Model 6 and 10	Model 7 and 11	Model 8 and 12	Model 13	Model 14	Model 15	Model 16
Whether had drunk alcohol at baseline	No (reference category)	350	64						Block 1	Block 1	Block 1	Block 1	Block 1	Block 1	Block 1	Block 1
	Yes	196	36													
Number of units of alcohol consumed at baseline		186		4.67 (5.31)									Block 2	Block 2	Block 2	Block 2
Mother's drinking	Mum does not drink (reference category)	177	32													
	Mum drinks	310	56													
	DK	55	10													
	I do not have/ do not see Mum	8	1													
Father's drinking	Dad does not drink (reference category)	125	23													
	Dad drinks	329	60													
	DK	45	8													
	I do not have/ do not see Dad	51	9		Block 1	Block 1	Block 1	Block 1	Block 2	Block 2	Block 2	Block 2	Block 3	Block 3	Block 3	Block 3
Sibling(s)' drinking	Siblings do not drink (reference category)	258	47													
	Sibling(s) drink	170	31													
	No sibling(s)	84	15													
	DK if sibling(s) drink	35	6													
Friends drinking at least weekly	Few or none (reference category)	366	66													
	About half/most/all	75	14													
	DK/not stated	111	20													
Gender	Male (reference category)	275	50													
	Female	277	50													
Age		552		12.95 (0.39)												
Social Grade	ABC1 (reference category)	224	41													
	C2DE	326	59		Block 2	Block 2	Block 2	Block 2	Block 3	Block 3	Block 3	Block 3	Block 4	Block 4	Block 4	Block 4
Ethnicity	White (reference category)	515	94													
	Asian or asian british/mixed/other	34	6													
Religion	None (reference category)	169	31													
	Any	378	69													
Perceptions of siblings/parents/friends/ views on whether it is ok to try drinking (1=not ok, 7=ok)		552		3.61 (2.09)	Block 3	Block 3	Block 3	Block 3	Block 4	Block 4	Block 4	Block 4	Block 5	Block 5	Block 5	Block 5
Liking of school (1=dislike a lot, 5=like a lot)		547		3.48 (1.22)	Block 4	Block 4	Block 4	Block 4	Block 5	Block 5	Block 5	Block 5	Block 6	Block 6	Block 6	Block 6

Perceptions of own school work relative to others in own year (1= a lot worse, 5 = a lot better)	545	3.54 (0.891)			
Liking of adverts in general (1=dislike a lot, 5 = like a lot)	546	2.87 (1.15)			
Number of alcohol marketing channels aware of	552	5.44 (2.69)	Block 5	Block 6	Block 7
Number of forms of alcohol marketing involved in	552	0.90 (1.09)	Block 5	Block 6	Block 7
Number of alcohol brands recalled	552	5.58 (2.95)	Block 5	Block 6	Block 7
Appreciation of alcohol advertising (1=dislike a lot, 5 = like a lot)	542	2.36 (1.06)	Block 5	Block 6	Block 7

Measures

The measures employed in this study were based upon a review of the youth drinking literature. Due to constraints in terms of space within the questionnaire and the requirement to include a number of measures assessing marketing awareness and involvement, some measures, such as parental control, were not included in the study.

Demographic and school related control variables

Data were recorded on age, gender, social grade (based upon occupation of chief income earner), ethnicity and religion. Liking of school was rated on a five point scale, from 'dislike school a lot' (1) to 'like school a lot' (5). Rating of own school work in relation to others in their year was also rated on a five point scale, from 'a lot worse' (1) to 'a lot better' (5).

Drinking related control variables

Drinking among parents, siblings and friends was assessed using four self-completion items. Participants were asked whether their mother (father) drinks alcohol nowadays, with four responses to each item: yes; no; not sure; I do not have/don't see my mother (father). Those who indicated they had brothers or sisters were asked whether any of their brothers or sisters drink alcohol: yes; no; don't know. Participants were asked to indicate, on a five point scale, how many of their friends drink alcohol once a week: all of them; most of them; about half of them; a few of them; none of them; not sure. Perceptions of others' views on them trying alcohol was assessed using three self-completion items, which asked whether their brother(s) or sister(s), parents or closest friends would consider it ok or not ok for them to "try drinking alcohol to see what it's like". Response categories were: ok, not ok and don't know, which were combined following principal components analysis at baseline and are reported elsewhere (Gordon *et al.* 2011).

Drinking behaviour

Drinking status was assessed by asking the question: 'Have you ever had a proper alcoholic drink - a whole drink, not just a sip?' Those answering affirmatively were classified as drinkers, and those who had not done so as non-drinkers.

Uptake of drinking was based on changes in drinking status between waves and was coded (1) for baseline non-drinkers who were drinkers at follow-up and coded (0) for baseline non-drinkers who remained non-drinkers at follow-up.

Number of alcoholic units consumed last time respondents had an alcoholic drink was calculated by estimating the amount, in millilitres, of each type of alcoholic drink consumed and the ABV of each drink, based on responses to the following: brand or name of drink(s) consumed, type(s) of alcohol consumed (e.g. beer, wine, vodka), drinking vessel(s) used (recorded using a visual), and the amount of each drink consumed (more than one full bottle/can/glass, one full bottle/can/glass, $\frac{3}{4}$, $\frac{1}{2}$, $\frac{1}{4}$ or less than $\frac{1}{4}$ of a bottle/can/glass).

Frequency of drinking was recorded by asking respondents how often they usually had an alcoholic drink (daily, twice per week, weekly, fortnightly, monthly, only a few times per year, or I never drink alcohol now).

Alcohol marketing

Alcohol marketing awareness was assessed for 15 types of marketing identified from formative research (Gordon *et al.* 2010b). Participants were shown a series of 15 cards with examples of different forms of alcohol marketing (Table 10.2a) and were asked to indicate whether or not they had come across alcohol being marketed in each of these ways. The number of channels

through which participants had noticed marketing was calculated by counting the number of positive responses for each of the 15 channels listed in Table 10.2a.

Involvement in alcohol marketing was assessed by showing participants eight cards with examples of different forms of alcohol promotional activities and asking them to indicate whether or not they had participated in each. The amount of alcohol marketing participated in was calculated by counting the number of positive responses for each of the eight forms listed in Table 10.2b.

Liking of alcohol advertising was measured on a five point scale, from ‘dislike alcohol adverts a lot’ (1) to ‘like alcohol adverts a lot’ (5).

Statistical Analysis

The analyses looked at four outcome variables – uptake of drinking, uptake of fortnightly drinking, uptake of monthly drinking and units of alcohol consumed at follow-up. For each of these outcomes, four models were run to separately examine their potential association with amount of alcohol marketing aware of, amount of alcohol marketing involved in, number of brands recalled and appreciation of alcohol advertising, all measured at baseline. Table 10.1 shows the dependent and independent variables used within a series of logistic regression models that were run to examine association between baseline characteristics and uptake of drinking (models 1-4) and uptake of frequent drinking (models 5-12). Table 10.1 also shows the multiple regression models (models 13-16) that were run to examine association between baseline characteristics and amount of alcohol consumed at follow-up. In the logistic and multiple regression models, independent variables were entered in blocks, using forward

likelihood ratio, with the marketing variable of interest entered in the final block to examine the potential contribution after important confounding variables had been considered.

Among those who were non-drinkers at baseline (n=350), logistic regression was used to examine which baseline characteristics were associated with uptake of drinking by follow-up. Uptake of drinking was used as the dependent variable (1= started drinking by follow-up, 0 = remained non-drinker at follow-up). In each of the logistic regression analyses, several potentially confounding variables were controlled for and entered in the following blocks: (1) drinking among siblings, friends, mother and father; (2) gender, age, social grade, ethnic group, religion; (3) perceptions of siblings', parents', friends' views on whether it was ok to try drinking; (4) liking of school, perception of own school work relative to others in their year, liking of adverts in general. Four separate models were run. In each case the control variable in the final block was varied as follows: the number of alcohol marketing channels respondents were aware of (model 1); involvement with alcohol marketing (model 2); number of brands recalled (model 3); appreciation of alcohol advertising (model 4).

Logistic regression was also used to examine frequency of drinking. This was examined at two levels: 1) uptake of fortnightly drinking; and 2) uptake of monthly drinking (among those who, at baseline, did not drink at all or drank less than fortnightly or monthly, respectively). Due to the small sample size, these analyses also included uptake of at least fortnightly (or monthly) drinking among baseline non-drinkers rather than just increased frequency among existing drinkers. Independent variables were again entered in blocks to control for potentially confounding variables. The first block controlled for baseline drinking status and subsequent blocks controlled for the same variables included in the analysis of uptake of drinking.

Among those who were drinkers at follow-up (n=342), multiple regression was used to examine the relationship between baseline characteristics and units consumed at follow-up, after controlling for units consumed at baseline (see Table 10.1, Models 13-16). Blocks one and two controlled for baseline drinking status and baseline units consumed, respectively. And subsequent blocks, in Models 13-16, controlled for the same variables as the logistic regression. Four separate models were run, again varying the control variable in the final block; number of forms of alcohol marketing aware of at baseline (model 13); number of forms of alcohol marketing involved in at baseline (model 14); number of brands recalled at baseline (model 15); baseline appreciation of alcohol advertising (model 16).

In the logistic and multiple regression models, cases were excluded if they had missing data on one or more of the variables being assessed in the model. The number of excluded cases in any analyses ranged from 16 to 32 representing a very small portion of the eligible sample in each (5%-6%).

Results

Alcohol drinking behaviour

At follow-up, 62% (n=342) reported having tried an alcoholic drink. This is lower than the prevalence (81%) from national survey data (Black *et al.* 2009). Mean age for consumption of first alcoholic drink was 13.4 years (SD = 1.44) and mean number of units consumed for last drink at follow-up was 7.12 (SD = 7.37).

Awareness of alcohol marketing

At baseline there was very high awareness of alcohol marketing, with 97% aware of at least one form of alcohol marketing. The sample was aware of, on average, five marketing channels,

see Table 10.2a. Awareness was measured across a range of channels including advertisements and promotions, sports related marketing, electronic communications and arts related marketing, with awareness highest for TV/cinema advertising (77%), branded clothing (67%), sports sponsorship (63%), price promotions (59%) and signs or posters in-store (58%).

Involvement with alcohol marketing

At baseline, more than half (56%) had participated in at least one form of alcohol marketing. The most common types of alcohol marketing respondents were involved with were ownership of alcohol branded clothing (45%) and free branded gifts (11%), see Table 10.2b.

Table: Adolescents' awareness of & involvement in alcohol marketing at baseline

<i>Base: all participating at baseline and follow-up</i>	Total N = 552	
	%	N
	(valid)	
(a) Awareness of Alcohol Marketing		
Any alcohol marketing	97	533
Ads and promotions		
TV/Cinema	77	423
Posters/Billboards	52	287
Newspapers/Magazines	31	169
In-store	58	321
Price promotions	59	323
Sports-related		
Sports Sponsorship	63	347
Clothing	67	368
Electronic communications		
E-mail	4	21
Websites	5	30
Mobile Phone/Computer Screensaver	23	126
Social networking sites	12	65
Arts-related		
Music Sponsorship	33	184
TV/Film Sponsorship	30	163
Celebrity endorsement	13	73
Product design	18	101

Mean number (std dev) of marketing channels aware of	5.4 (2.7)	
(b) Participation in Alcohol Marketing		
Any involvement in alcohol marketing	56	308
Free samples	3	15
Free branded gifts	11	58
Price promotions	8	46
Promotional mail/e-mails	7	39
Branded clothing	45	250
Websites	3	19
Mobile phone/computer screensavers	6	35
Social networking sites	7	37
Mean number (std dev) of forms of alcohol marketing involved in	0.9 (1.1)	

Association between alcohol marketing and initiation of drinking

Among the 350 who were non-drinkers at baseline, 47% (n=165) started drinking between baseline and follow-up. Logistic regression demonstrated a significant association between the amount of alcohol marketing that non-drinkers' were involved in at baseline and their uptake of drinking at follow-up (Model 2), see Table 10.3. Involvement with alcohol marketing at baseline increased their chance/risk of initiation of drinking at follow-up (adjusted OR=1.31, $p<0.05$). Other factors associated with uptake of drinking were having siblings who drink (adjusted OR=1.97, $p<0.05$ compared with having non-drinking siblings) and holding more positive perceptions that others consider it ok for them to drink (adjusted OR=1.19, $p<0.01$). Uptake of drinking was less likely among non-white ethnic groups (adjusted OR=0.1, $p<0.01$). A further logistic regression, (Model 4), indicated that initiation of drinking was also more likely among those with greater appreciation of alcohol advertising at baseline (adjusted OR = 1.272, 95% CI 1.005, 1.610, $P<0.05$). After controlling for confounders no association was found between uptake of drinking and baseline awareness of alcohol marketing (Model 1) or number of brands recalled at baseline (Model 3).

Among the 513 who were non-drinkers or drank less often than fortnightly at baseline, 15% (n = 78) had taken up more frequent drinking (at least fortnightly) at follow-up.

Logistic regression found that uptake of fortnightly drinking was more likely among those with a higher involvement with alcohol marketing at baseline (adjusted OR = 1.43, $P < 0.05$; Model 6, see Table 10.4).

Table: Logistic regression of association between amount of involvement in alcohol marketing and uptake of drinking

Dependent variable = Uptake of drinking (1= initiated drinking, 0=remained non-drinker)

Base: All in cohort who were non-drinkers at baseline

	N	Adjusted Odds Ratio	95.0% C.I. for Adj Odds Ratio		Significance
<i>Block 1</i>					
Sibling drinking					
Sibling(s) do not drink	188	1.00			ns
Sibling(s) drink	78	1.971	1.098	3.538	<0.05
No sibling(s)	47	1.212	0.606	2.426	ns
Don't know if sibling(s) drink	21	1.846	0.676	5.042	ns
Friends' drinking					
Few or none drink	239	1.000			<0.05
About half/most/all drink	19	2.664	0.891	7.960	ns
Not sure/not stated	76	0.584	0.325	1.048	ns
Mother's drinking					
Mum does not drink	121	1.000			ns
Mum drinks	174	1.641	0.966	2.789	ns
Not sure/not stated	34	2.206	0.942	5.166	ns
No mum/don't see mum	5	1.198	0.173	8.3	ns
<i>Block 2</i>					
Ethnic Group					
White	303	1.00			
Asian or Asian					
British/mixed/other	31	0.1	0.022	0.462	<0.01
<i>Block 3</i>					
Perceptions of others' views on trying alcohol (-ve = not ok, +ve = ok)					
	334	1.195	1.049	1.363	<0.01
<i>Block 5</i>					
Number of forms of alcohol marketing involved in					
	334	1.310	1.003	1.711	<0.05

334 cases analysed, 16 cases excluded from the analysis due to missing data on one or more variables tested in the model
 Note: only variables that entered each block using forward likelihood ratio are shown. See Table 10.1 for full list of variables considered for entry to the model – Model 2.

Model Summary at Each Block

	Test of Model Coefficients			Nagelkerke R square
	Chi-square	df	P	
Block 1	32.588	8	<0.001	0.124
Block 2	16.936	1	<0.001	0.184
Block 3	8.208	1	<0.01	0.212
Block 4	No variables entered			
Block 5	4.013	1	<0.05	0.225
Final Model	61.746	11	<0.001	0.225

Cases correctly classified = 65.9%. 65.9% of remaining non-drinkers and 65.8% of those who initiated drinking were correctly classified

Table: Logistic regression of association between amount of involvement in alcohol marketing at baseline and drinking becoming more frequent (drinking at least fortnightly) at follow-up

Dependent variable = whether had become fortnightly drinker (or more frequent) at follow-up (1= yes became fortnightly (or more frequent) drinker, 0=remained non-drinker or less than fortnightly drinker)
 Base: All in cohort who were non-drinkers at baseline or drank less often than fortnightly

	N	Adjusted Odds Ratio	95.0% C.I. for Odds Ratio		Significance
<i>Block 1</i>					
Whether drank alcohol at baseline					
No	332	1.00			<0.05
Yes	157	1.849	1.048	3.263	<0.05
<i>Block 2</i>					
Sibling drinking					
Sibling(s) do not drink	239	1.00			ns
Sibling(s) drink	147	1.805	0.962	3.387	ns
No sibling(s)	75	2.110	1.013	4.398	<0.05
Don't know if sibling(s) drink	28	3.059	1.071	8.737	<0.05
<i>Block 3</i>					
Religion					
None	144	1.00			<0.05
Any	345	0.573	0.334	0.982	<0.05
<i>Block 4</i>					
Perceptions of others' views on trying alcohol (1 = not ok, 7 = ok)					
	489	1.184	1.033	1.358	<0.05
<i>Block 6</i>					
Number of forms of alcohol marketing involved in					
	489	1.434	1.146	1.795	<0.01

489 cases analysed, 28 cases excluded from the analysis due to missing data on one or more variables tested in the model
 Note: only variables that entered each block using forward likelihood ratio are shown. See Table 10.1 for full list of variables considered for entry to the model – Model 6.

Model Summary at Each Block

	Test of Model Coefficients			Nagelkerke R square
	Chi-square	df	P	
Block 1	19.840	1	<0.001	0.068
Block 2	8.120	3	<0.05	0.096
Block 3	6.156	1	<0.05	0.116
Block 4	6.397	1	<0.05	0.137
Block 5	No variables entered			
Block 6	9.926	1	<0.01	0.169
Final Model	50.440	7	<0.001	0.169

Cases correctly classified = 84.7%. 98.8% of those who remained non-drinkers or less than fortnightly drinkers and 9.1% of those who became fortnightly (or more frequent) drinkers were correctly classified

Other factors associated with becoming a fortnightly drinker were being a drinker at baseline (adjusted OR=1.85, p<0.05) and holding more positive perceptions that others consider it

acceptable for them to drink (adjusted OR=1.18, $P<0.05$). Those who indicated a religious affiliation were less likely than those with no affiliation to become fortnightly drinkers (adjusted OR=0.57, $p<0.05$). Further logistic regressions (Model 5) indicated that uptake of fortnightly drinking was also more likely among those with greater awareness of alcohol marketing at baseline (adjusted OR=1.11, 95% CI 1.005, 1.234, $p<0.05$ (Model 5)) and those with greater appreciation of alcohol marketing at baseline (adjusted OR=1.295, 95% CI 1.002, 1.674, $p<0.05$ (Model 8)). After controlling for confounders, no association was found between uptake of fortnightly drinking at follow-up and number of brands recalled at baseline (Model 7).

Among the 498 who were non-drinkers or drank less often than monthly at baseline, 23% ($n=115$) had taken up more frequent drinking (at least monthly) at follow-up. As shown in Table 10.5. Uptake of monthly drinking was more likely among those with a higher involvement with alcohol marketing at baseline (adjusted OR=1.33, $p<0.05$ (see Table 10.5, Model 10)). Becoming a monthly drinker was also associated with believing that others consider it acceptable for them to try drinking (adjusted OR=1.25, $p<0.001$), having siblings who drink (adjusted OR=2.06, $p<0.01$) and having a mum who drinks (adjusted OR=1.88, $p<0.05$). Those indicating a religious affiliation were less likely than those with no religious affiliation to take up monthly drinking (adjusted OR=0.58, $p<0.05$). After controlling for confounders, no association was found between uptake of monthly drinking at follow-up and baseline awareness of alcohol marketing (Model 9), number of brands recalled at baseline (Model 11) or baseline appreciation of alcohol advertising (Model 12).

Table: Logistic regression of association between amount of involvement in alcohol marketing at baseline and drinking becoming more frequent (drinking at least monthly) at follow-up

Dependent variable = whether had become monthly drinker (or more frequent) at follow-up (1= yes became monthly (or more frequent) drinker, 0=remained non-drinker or less than monthly drinker) Base: All in cohort who were non-drinkers at baseline or drank less often than monthly

	N	Adjusted Odds Ratio	95.0% C.I. for Odds Ratio		Significance
Block 1					
Whether drank alcohol at baseline					ns
No	332	1.00			
Yes	142	1.550	0.936	2.567	ns
Block 2					
Sibling drinking					ns
Sibling(s) do not drink	236	1.00			
Sibling(s) drink	139	2.062	1.202	3.539	<0.01
No sibling(s)	72	1.696	0.877	3.279	ns
Don't know if sibling(s) drink	27	1.625	0.583	4.530	ns
Mother's drinking					ns
Mum does not drink	152	1.00			
Mum drinks	263	1.879	1.067	3.309	<0.05
Not sure/not stated or no mum/don't see mum	59	1.212	0.534	2.751	ns
Block 3					
Religion					<0.05
None	137	1.00			
Any	337	0.577	0.354	0.941	<0.05
Block 4					
Perceptions of others' views on trying alcohol (1 = not ok, 7 = ok)	474	1.249	1.109	1.407	<0.001
Block 6					
Number of forms of alcohol marketing involved in	474	1.328	1.072	1.644	<0.05

474 cases analysed, 28 cases excluded from the analysis due to missing data on one or more variables tested in the model. Note: only variables that entered each block using forward likelihood ratio are shown. See Table 10.1 for full list of variables considered for entry to the model – Model 10.

Model Summary at Each Block

	Test of Model Coefficients			Nagelkerke R square
	Chi-square	df	P	
Block 1	21.343	1	<0.001	0.066
Block 2	12.954	5	<0.01	0.129
Block 3	7.104	1	<0.01	0.149
Block 4	14.425	1	<0.001	0.190
Block 5	No variables entered			
Block 6	6.803	1	<0.01	0.208
Final Model	70.825	9	<0.001	0.208

Cases correctly classified = 77.2%. 94.5% of those who remained non-drinkers or less than monthly drinkers and 22.1% of those who became monthly (or more frequent) drinkers were correctly classified

Alcohol marketing and units of alcohol consumed last time had a drink

Multiple regression analysis, controlling for demographics, baseline drinking status, amount consumed at baseline and other drinking related variables, found no association between units consumed at follow-up and baseline measures of awareness or involvement in alcohol marketing, number of brands recalled or appreciation of alcohol advertising (Models 13-16).

Discussion

The findings show a small but significant association between awareness of and involvement with alcohol marketing, and youth drinking behaviour, even after controlling for important confounding variables. They also show a small but significant association between appreciation of alcohol advertising and youth drinking behaviour. Marketing is of course only one of a number of variables that can influence youth drinking with other factors such as family drinking and peer influence also significant, often to a greater degree. However, our findings from the UK are consistent with previous research and add further weight to there being an association between alcohol marketing and youth drinking behaviour (Anderson *et al.* 2009b; Meier *et al.* 2008), with higher awareness of alcohol marketing at baseline predicting increased frequency of drinking at follow-up. This dose-response relationship is also consistent with that found with awareness of tobacco marketing and tobacco consumption among young people (Davis *et al.* 2008).

Unlike most previous research we examined the influence of alcohol marketing across a wide range of marketing channels, including new media, sponsorship and e-marketing, helping to demonstrate the extent, nature and reach of contemporary alcohol marketing in the UK. Indeed, at baseline, young people were aware of an average of five alcohol marketing channels. Previous research has found associations between channels such as TV, print advertising, and

in-store promotion (Stacey *et al.* 2004; Ellickson *et al.* 2005; Snyder *et al.* 2006) and youth drinking behaviours. Although the sample size in the current study does not allow sufficient power to detect the effect of individual marketing channels on drinking behaviour some channels are clearly more prominent than others. Almost two-thirds of youth (63%) were aware of sports sponsorship and 45% owned alcohol branded clothing, which is most likely due to ownership of football shirts from the two major football teams in the area, which are sponsored by a beer brand (Gordon *et al.* 2011). This is a relationship which is concerning given the appeal of sport to young people (Stainback, 1997).

At baseline, 12% of the cohort was aware of alcohol marketing on social networking sites, and 7% accessed alcohol marketing through this channel. Interestingly, although not reported in the results, at follow-up awareness of (34%) and involvement with (18%) social networking sites increased markedly, which is testament to the growth of new media as a marketing tool. This is disconcerting, if not entirely surprising, given that a recent report by Ofcom found that approximately half of 11-17 year olds have a social networking profile (Ofcom, 2008). Furthermore, the level of awareness of (23%) and involvement with (6%) alcohol branded mobile phone/computer screensavers at baseline illustrates the reach of alcohol marketing across a range of communication channels. The opportunity to enjoy 24 hour connectivity through mobile web browsing restricts the ability to monitor new media use and control the level of exposure to content such as alcohol marketing. Given that technological advancement in new media develops at such pace regulation tends to lag behind, which gives rise to concerns over the impact alcohol marketing in new media has on young people (BMA, 2009).

Our findings point to the need for additional research on the impact of new media, and other less researched forms of alcohol marketing such as sponsorship (House of Commons Health

Committee, 2010), to help assess the cumulative effect of *all* alcohol marketing on youth drinking (Hastings *et al.* 2005). Our measures of awareness and involvement in alcohol marketing were based on self-report measures modelled on successful approaches used in the tobacco marketing field (MacKintosh *et al.* 2008) and reflect young people's recall of the different forms of alcohol marketing that they may have been exposed to. The approach provides a valuable insight into the extent of awareness of and involvement with different forms of alcohol marketing. However, given that we did not assess volume of exposure e.g. number of hours exposed to TV advertising (Jernigan *et al.* 2007; Chung *et al.* 2010) then further research exploring level of exposure to alcohol marketing and association with youth drinking in the UK would also be welcome. Finally, cohort studies tracking young people through to adulthood would also help provide information on the longer term effects of alcohol marketing once adulthood is reached.

The study is not without limitations. Four main issues limit the generalisability of the findings; 1) the study location, which was confined to the West of Scotland; 2) the small, albeit significant, effect size of alcohol marketing on drinking behaviour featuring fairly wide confidence intervals; 3) the relatively small cohort sample; 4) loss of respondents due to attrition. However, there are reasons to suggest that each of these potential limiting factors have not had a significant effect on the study findings; 1) despite the study location, awareness of alcohol marketing in conventional and electronic media, and sports sponsorship, is unlikely to differ significantly across the UK; 2) although the alcohol industry criticises research finding only a small causal effect between marketing and drinking behaviour on the grounds that it does not consider other factors influencing alcohol behaviour (ICAP, 2003), we did examine and control for multiple predictor variables within the analyses; 3) despite a relatively small sample our findings are consistent with previous longitudinal research from outside the UK; 4)

while the baseline gender and social grade characteristics of the cohort differed from those lost to attrition, these characteristics were controlled for in each analysis and there were no differences, between those followed-up and those lost to attrition in terms of drinking status, age, ethnicity or religion.

Our findings and the existing evidence base have important implications for the regulation of alcohol marketing in the UK, and indeed elsewhere. The current co-regulatory system employed in the UK appears to provide inadequate protection for youth from exposure to alcohol marketing. Co-regulation is incontrovertibly preferable to self-regulation, which has been found to be ineffective for smoking (Saloojee and Hammond, 2001) and gambling (McMillen and Toms, 1998), but it is reliant upon industry co-operation. In the face of research demonstrating the impact of alcohol marketing on youth, and accepting that the primary imperative for alcohol companies is to increase profit and market share, regulators must act accordingly.

Policy options available include more stringent regulation controlling the content and level of exposure to alcohol marketing across all channels, including new media, sponsorship and e-marketing. The 'Loi Evin' in France, for instance, is an example of more robust regulation which restricts alcohol marketing content and exposure, particularly with regards to sports sponsorship (Rigaud and Craplet, 2004). However, such a framework would require explicit guidance on what is allowed, rather than merely stating what is forbidden, in order to avoid ambiguity. Another option is a complete ban on some forms of alcohol marketing (Anderson, 2009; Gilmore, 2009), although even here it would be imprudent to ignore lessons from the tobacco field. Restrictions in some forms of tobacco marketing only have a marginal impact on behaviour as tobacco companies simply reallocate marketing spend to unregulated channels

(Davis *et al.* 2008). What is clear is that the evidence and current focus on alcohol marketing as a public health concern suggests that the time for a considered policy response is now (House of Commons Health Committee, 2010).

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