Exposure to alcohol advertising and teen drinking

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ABSTRACT

Objective. Assessing the association between alcohol ad exposure and alcohol use in German adolescents, controlling for general ad exposure.

Method. Cross-sectional survey of 3415 sixth to eighth graders (mean 12.5 years) from 29 schools in three German states (June 2008). Exposure to 9 alcohol and 8 non-alcohol advertisements was measured with masked ad images; students indicated contact frequency and brand recall. Main outcomes were ever drinking, current drinking, bing drinking, alcohol use intentions and outcome expectancies.

Results. There was a bivariate association between both exposures [alcohol and non-alcohol ads] and all alcohol use measures. After adjustment for confounding, only alcohol ad exposure retained a significant association with outcomes. Multi-level logistic regressions revealed that compared with quartile one alcohol ad exposure, the adjusted odds ratios for quartile four were 2.4 (95% confidence interval 1.7–3.4) for trying drinking, 2.7 (1.8–3.9) for current drinking and 2.3 (1.6–3.5) for ever binge drinking. There was also an independent association between alcohol ad exposure and alcohol-related attitudes among never drinkers.

Conclusion. This study demonstrates a positive association between exposure to alcohol advertising and multiple youth drinking outcomes, showing that the association is content-specific, not just a function of general ad exposure.

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Introduction

Alcohol is the most popular drug among European adolescents and a frequent cause of death in this age group (Anderson and Baumberg, 2006; Hibell et al., 2009; Rehm and Gmel, 2002; Schmid et al., 2003). Exposure to alcohol marketing and advertising is considered as one factor that might encourage young people to consume alcoholic beverages (Anderson et al., 2009; Smith and Foxcroft, 2009). Although this position is not unequivocally accepted by all parties (it is especially doubted by the alcohol and advertising industries (International Center for Alcohol Policies (ICAP), 2002; ZAW, 2008)), empirical evidence is growing in favor of this hypothesis. In addition to several econometric studies that use aggregated data to examine the relationship between overall levels of alcohol consumption and overall levels of advertising (Nelson and Moran, 1995; Saffer and Dave, 2006), there are also individual-level studies with either experimental (Dunn and Yniguez, 1999; Engels et al., 2009), cross-sectional (Aitken et al., 1988; Atkin et al., 1984; Hurtz et al., 2007; Unger et al., 1995) or longitudinal design (Collins et al., 2007; Connolly et al., 1994; Elickson et al., 2005; Henriksen et al., 2008; Snyder et al., 2006; Stacy et al., 2004) that have examined the association between various measures of advertising exposure and adolescent drinking outcomes. Two recently published systematic reviews of the longitudinal studies concluded that “the data from these studies suggest that exposure to alcohol advertising in young people influences their subsequent drinking behaviour” (Smith and Foxcroft, 2009) (p.9), and that there is “[…] consistent evidence to link alcohol advertising with the uptake of drinking among non-drinking young people” (Anderson et al., 2009) (p.241).

Albeit these strong conclusions about the current state of evidence, there are still a number of reasons for conducting further research. First, many of the studies cited above did not assess exposure to alcohol advertising. Even in the methodologically strict selection of the Smith and Foxcroft review (Smith and Foxcroft, 2009), 3 of the 7 reported studies examined other media influences like exposure to TV and music videos or alcohol depictions in popular movies (Robinson et al., 1998; Sargent et al., 2006; Van den Bulck and Beullens, 2005). Second, we found two studies that concurrently assessed exposure to non-alcohol advertisings (Unger et al., 1995; Stacy et al., 2004), but neither study included this measure as a covariate in their analysis. Thus the exposure–behavior relation lacks specificity, a key feature of causal arguments in epidemiological research (Hill, 1965). The amount of alcohol advertising exposure might only be a marker variable, indicating a student that has high advertising exposure in general. A control of exposure to non-alcohol advertising could strengthen the case that the reported association is specific to the...
alcohol advertising content. Third, with the exception of one study (Stacy et al., 2004), binge drinking was not assessed as an outcome. However, risky or harmful use of alcohol seems to be at the heart of concerns about youth alcohol use.

The aim of the present study was to assess the cross-sectional association between alcohol ad exposure and youth drinking outcomes (including binge drinking), controlling for exposure to non-alcohol ads.

Methods

Study sample

The study sample was recruited from three German states. From 744 schools on state listings, 120 schools were randomly drawn and invited for participation in May 2008. The selection was stratified by region and type of school, assuring a balanced representation of all German school types. Twenty-nine schools with 174 classes and 4195 sixth to eighth grade students agreed to participate after a four week recruitment interval. School type composition of participating schools did not differ systematically from that of non-participating schools or from the official school statistics ($\chi^2(3) = 0.74$; n.s.). Six hundred forty-five students (15.4%) from the 29 participating schools had to be excluded because they did not provide parental permission; 134 students (3.2%) were absent on the day of the survey; one questionnaire had unreadable data, resulting in a final sample of 3415 students (81.4%).

Survey implementation

Data were collected through self-completed anonymous questionnaires during one school hour, administered by trained research staff. Only students with written parental consent were qualified for participation, parent consent forms were disseminated by class teachers three weeks prior to the data assessment. After completion of the survey, questionnaires were placed in an envelope and sealed in front of the class. Students were assured that their individual information would not be seen by parents or teachers. Study implementation procedures were approved by all Ministries of Cultural Affairs, and ethical approval was obtained from the Ethical Committee of the Medical Faculty of the University of Kiel (Ref.: D 417/08).

Measures

Student self-reports included (1) demographic data (age and gender), (2) advertising exposure measures, (3) outcome measures (alcohol use) and (4) potential confounders.

Advertising exposure

Alcohol advertising exposure has been operationalized in numerous ways across studies (Unger et al., 2003; Smith and Foxcroft, 2009). Researchers in the field have measured exposure both in terms of the physical presence of advertisements in individuals' environments and in terms of the psychological processes underlying individuals' memories for these advertisements (Klitzner et al., 1991). The method implemented in the present study is nearer to the second interpretation of exposure and operationalizes ad exposure as contact frequency and brand recall, a procedure that has already been successfully used in other studies (Grube and Wallack, 1994; Henriksen et al., 2008). Students were provided with masked coloured images of different advertisements (fixed-imagess of TV commercials) with all brand information digitally removed (see Fig. 1). Advertising selection was based on a pilot study on 34 alcohol and non-alcohol TV ads (110 students aged 11 to 16 years; 3 = mean age 13.6 years, but not daily). Ads for the ady? (Lubke et al., 2008), beer, or floor effects and had corrected item–test correlations above $r_{pt} = .40$. The final sample of 17 images used in the main study included nine alcohol ads, mostly for beer or mixed beer drinks, and eight "control" ads for other products (see Table 1).

For each ad image students were asked to rate how often they had ever seen the respective ad on a 4-point scale with scale points 0 = "Never", 1 = "1 to 4 times", 2 = "5 to 10 times" and 3 = "More than 10 times") and which brand was advertised (open format). Correct brand names were post coded as 1, all other answers as 0. As it turned out that contact frequency and cued brand recall was highly internally consistent, the two measures were combined into a single scale, labelled "alcohol ad exposure" and "other ad exposure". Cronbach's alpha was .83 for the alcohol ads and .74 for the non-alcohol ads, respectively.

Outcome measures

Ever alcohol use was assessed with "Have you ever drunk alcohol?" (yes/no). Students who answered "no" to this question could skip the next page which contained questions about current alcohol use, measured with the question "How often do you currently drink alcohol?" on a five-point scale with scale points 0 = "Never", 1 = "Less than once a month", 2 = "At least once a month, but not every week", 3 = "At least once a week, but not every day", 4 = the daily? (Hibell et al., 2008), and binge drinking with the question "How often have you had 5 or more drinks on one occasion?" (0 = "Never", 1 = "Once", 2 = "2 to 5 times", 3 = "More than 5 times") (Lintonen et al., 2004; Wechsler and Nelson, 2001). Students without ever used receive the value "0" on the current use and binge drinking measure.

Alcohol use intentions and outcome expectancies were assessed with two types of measures. We asked about future use intention ("Do you think you will drink alcohol in the future?", scale points 0 = "Definitely not", 1 = "probably not", 2 = "probably yes", 3 = "definitely yes") and refusal intention ("If one of your friends offered you an alcoholic beverage, would you take it?", same format) (Pierce et al., 1996). Additionally, students were asked about alcohol outcome expectancies, rating that alcohol (a) is relaxing, (b) makes you more outgoing, (c) brings a good mood, and (d) is something you would like to try (Cronbach's alpha = .74). We combined the intention and expectancy measures and formed a single "favorable attitudes towards alcohol" index (range 0 to 3).

Covariates

Potential confounders included: age; gender; parent (mother and father) drinking (0 = "Never", 1 = "Rarely", 2 = "Often, but not daily", 3 = "Daily"), peer drinking (0 = "None", 1 = "Some", 2 = "Most", 3 = "All"); rebelliousness and sensation-seeking (4-items combined into a single index, with higher scores indicating greater propensity for rebelliousness and sensation seeking, Cronbach's alpha = .76) (Russo et al., 1993); self-reported school performance ("How would you describe your grades last
year? 

scale points excellent, good, average, below average; average TV screen time ("How many hours do you usually watch TV in your leisure time?"); scale points: none, about half an hour, about an hour, about two hours, about three hours, about four hours, more than four hours a day); socioeconomic status (SES) of the students was approximated with three items of the PISA cultural and social capital assessment, asking for the number of books in the household (5-point scale from 0 = “None” to 4 = “More than 100”) and parenting characteristics (“My parents always know where I am” and “My parents know other parents from my school”) (Kunter et al., 2002).

We validated our SES measure with an 11-item rating of the mean school SES of all class teachers had to fill out during data assessment (examples: “Most students of the school live in families with financial problems”, “Most students of the school come from underprivileged families”, Cronbach’s alpha = 0.85). Student-based and teacher-based SES correlated \( r = 0.57 \) (Cronbach’s alpha = 0.72).

**Analyses**

Bivariate associations between covariates and alcohol use were tested with chi-squared tests. Locally weighted scatter plots were used to graphically represent the relationship between advertising exposure and adolescent alcohol use. For the multivariate analysis, the exposure was parsed into quartiles and the dependent variables were dichotomized to represent frequencies of ever drinking, current drinking, ever binge drinking, and favorable attitudes towards alcohol. The dichotomization enabled us to have identical analyses for all four outcomes. Because the data were clustered at the classroom and school level, associations between the amount of advertising exposure and alcohol use were analyzed with multilevel mixed effects logistic regressions with random effects for school and class exposure to advertising served as the reference category.

**Results**

**Characteristics of the study sample**

The final sample consisted of 3415 students, of whom 51.6% were female. The mean age was 12.5 years (SD 1.06) with a range of 10 to 17 and a median of 12 years.

**Exposure to alcohol and non-alcohol advertising**

Overall, only 1.5% of the sample (\(N=51\)) reported to have never seen any of the presented alcohol ads (respective proportion for non-alcohol ads: 0.5%). Seventy percent of the students recognized more than half of the alcohol ads, 82% recognized more than half of the non-alcohol ads. Within ads, there was a variation in the proportion who recognized the ad, with some recognized by more than 80%, and others recognized by less than 35% (see Table 1).

Seventy four percent of the students correctly named at least one of the alcohol brands compared to 94% who named at least one correct non-alcohol brand. The most frequently (56%) recalled alcohol brand was "Jaegermeister", a liqueur brand. The highest brand recall rate for non-alcohol brands was found for “Kinder Pingui” (89%), a milk chocolate bar.

**Alcohol use experience**

Over half of the students (58%) reported having tried alcohol, 11% of the sample were current (past 30 day) users, and 22% of the students reported having at least one binge drinking experience (Table 2). There were significant gender and age differences for all drinking outcomes with boys having higher ever, current, and binge drinking frequency than girls and younger adolescents having lower prevalences on all outcomes than older adolescents.

**Association between exposure to advertising and alcohol use**

Fig. 2 shows lowess plots of the association between the amount of exposure to advertising and the three alcohol use outcomes. The shape of the curves is similar for alcohol ads vs. other ads, illustrating a positive crude linear relation for both ad types. The slopes indicate that the crude association between exposure to non-alcohol advertising and drinking behavior is weaker.

Table 3 provides results of unadjusted and adjusted multilevel mixed effects logistic regression analyses. In the unadjusted models, both exposure to alcohol ads and to non-alcohol ads were significantly associated with all alcohol use measures, with the crude odds ratios being higher for alcohol ads. Compared to the reference group (first quartile of exposure), the odds of ever drinking, current drinking, and binge drinking were 4–5 times higher in the group with the highest alcohol ad exposure and 2–3 times higher in the group with the highest non-alcohol ad exposure.

However, in the adjusted model, with simultaneous inclusion of both ad exposure types and with statistical control of potential confounders (including sociodemographics, social influences, and personality factors), only exposure to alcohol advertising retained a significant association to students’ alcohol use. The adjusted odds ratios for the highest quartile of alcohol ad exposure (compared to first quartile) were 2.4 (95%
Alcohol use among adolescents depending on gender and age. Data assessed in 29 German schools in June 2008.

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Girls</th>
<th>Boys</th>
<th>p&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Age 10–12</th>
<th>Age ≥13</th>
<th>p&lt;sup&gt;a&lt;/sup&gt;</th>
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<td>%</td>
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<td>%</td>
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<td>791</td>
<td>45</td>
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<td>55</td>
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</tr>
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<td>72</td>
<td>1106</td>
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<td>17</td>
<td>322</td>
<td>20</td>
<td></td>
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<td>8</td>
<td>128</td>
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<td>3</td>
<td>61</td>
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<td>2</td>
<td>0.1</td>
<td>5</td>
<td>0.3</td>
<td></td>
</tr>
</tbody>
</table>

"Binge Drinking"

|                  | n  | %   | n  | %   | n  | %   | n  | %   | n  | %   |                  |              |
|------------------|----|-----|----|-----|----|-----|----|-----|----|-----|                  |              |
| Never            | 2620| 78  | 1309| 81 | 1217| 75 | .001| 1508| 89 | 1110| 67 | .001              |
| Once             | 401 | 12  | 185 | 11  | 213| 13  |     | 138| 8  | 262| 16 |                   |
| 2 to 5 times     | 202 | 6   | 96  | 5   | 106| 7   |     | 39 | 2  | 163| 10 |                   |
| More than 5 times | 136 | 4   | 53  | 3   | 83 | 5   |     | 11 | 1  | 125| 7  |                   |

Variations of n because of missing values.

* p-values based on chi-squared tests.

b All students that never used alcohol received the lowest value on each of the subsequent variables.

cn=1438) to avoid confounding with current use. There were significant associations between alcohol and non-alcohol advertising exposure and favorable alcohol attitudes in the crude analysis, but no significant ORs for non-alcohol ad exposure in the multivariate analyses (Table 3). Adolescents in quartiles 2–4 of exposure had higher risk of being over median for favorable attitudes, with odds ratios being 1.7, 2.0, and 1.9 for quartiles 2, 3, and 4, respectively.

Discussion

This study examined the association between exposure to alcohol advertising and favorable attitudes towards alcohol was analyzed in the sub-sample of never drinkers (N=1438) to avoid confounding with current use. There were significant associations between alcohol and non-alcohol advertising exposure and favorable alcohol attitudes in the crude analysis, but no significant ORs for non-alcohol ad exposure in the multivariate analyses (Table 3). Adolescents in quartiles 2–4 of exposure had higher risk of being over median for favorable attitudes, with odds ratios being 1.7, 2.0, and 1.9 for quartiles 2, 3, and 4, respectively.

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This study examined the association between exposure to alcohol advertising and alcohol use in a large sample of 6th to 8th graders, the time when alcohol use rises dramatically in Germany. Analyses showed evidence for an independent, specific relationship between higher alcohol ad exposure and multiple measures of alcohol use, including current and binge drinking.

The analysis statistically controlled for an important potential confounder, that is exposure to other advertising contents. It had no association to youth drinking in the adjusted model which supports the notion that the advertising–behavior link is specific to the alcohol ad content and weakens the assumption that exposure to alcohol advertising is merely a marker variable for the general amount of exposure to advertising and a propensity to look for and memorize advertisings in general. In addition, the study revealed that alcohol ad exposure is related to binge drinking, an association that has insufficiently been considered in previous studies (Anderson et al., 2009; Smith and Foxcroft, 2009), but seems to be especially relevant in terms of problematic alcohol use of youth.

There are several limitations to the current study, the most important one being the cross-sectional design. Cross-sectional data do not inform about the temporal sequence of events, i.e., if the measured exposure preceded the alcohol outcomes. Does advertising lead to drinking or does drinking lead to higher attention of advertising? Temporal antecedence of exposure would be one, though not the only, important indication of a causal relationship (Hill, 1965). We tried to approach the question of temporal sequence within our design by considering the lifetime drinking status of the students. In the sub-sample analysis of never-drinkers we found that alcohol advertising exposure is associated with favorable alcohol-related attitudes and intentions in this group. That is, of course, also no proof of any causal direction, but suggests that exposure to alcohol advertising influences adolescents before they actually start to use alcohol. Second, the implemented method did not use a representative sample of all broadcasted TV ads and used masked material, therefore it does neither allow for an accurate estimation of the total amount of alcohol ad exposure of German adolescents nor the advertising market shares of specific brands.

Finally, alcohol use variables are based on self-reports and are therefore only a proxy of the actual behavior. This is not a unique feature of the present study and there is no likely explanation why those with high alcohol ad exposure should systematically over- (or under-) report their drinking behavior. Another issue is the potential bias due to the 18% study drop-out because of students’ absence and missing parental consent.

In sum, notwithstanding the above mentioned design limitations, the results add further support to the assumption that alcohol advertising is an independent risk factor for early problematic alcohol use.

Funding

This work was supported by the Deutsche Angestellten-Krankenkasse (DAK), a German Health Insurance Company.
### Table 3
Association between ad exposure and alcohol use/attitudes. Results of unadjusted and adjusted multilevel logistic regression analyses. Data assessed in 29 German schools in June 2008.

<table>
<thead>
<tr>
<th>Exposure to alcohol ads</th>
<th>Odds ratios (95% confidence intervals)</th>
<th>Unadjusted</th>
<th>Adjusted</th>
<th>Unadjusted</th>
<th>Adjusted</th>
<th>Unadjusted</th>
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<td>1.8</td>
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| Number of level 1 units = 3415 (students); number of level 2 units = 174 (classes); number of level 3 units = 29 (schools).

### Conflict of interest statement
The authors declare that there are no conflicts of interest.

### Acknowledgments
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### Appendix A. Supplementary data
Supplementary data to this article can be found online at doi:10.1016/j.ypmed.2010.11.020.

### References


