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# How alcohol advertising and sponsorship works: Effects through indirect measures

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1 How alcohol advertising and sponsorship works: effects through indirect  
2 measures

3 Keywords: alcohol sponsorship, self-regulation failure, evaluative learning, implicit  
4 attitudes

5 Word count: 3937

6 Abstract

7  
8 **Background:** We tested whether incidental exposure to alcohol marketing messages in  
9 sporting events (i) influenced automatic evaluation of brands and alcohol in general and (ii)  
10 if these processes occur through deliberative (conscious) or nonconscious processes.

11 **Methods:** Using an experimental design, participants watched a sport event containing (i) a  
12 prototypical alcohol brand, or (ii) a brand unrelated to alcohol (iii) or a non-prototypical  
13 alcohol brand. One hundred and nine participants were randomly assigned to either a  
14 cognitively depleting task to impair motivation for effortful conscious processing before  
15 watching the excerpt, or a control task. We measured indirect (implicit) and direct (explicit)  
16 attitudes toward alcohol and brands, and self-report measures assessing affective response  
17 toward the event, involvement in processing the message and identifications toward the  
18 playing teams.

19 **Results:** We found a positive main effect of incidental exposure to alcohol brands on  
20 indirect measures of attitudes toward alcohol as well as the specific brand. No effect of  
21 cognitive fatigue on indirect measure toward brands and alcohol was observed.

1 **Conclusion:** Incidental exposure to alcohol marketing messages appear to impact indirect  
2 measures of attitudes toward the brand and alcohol in general, and seems to rely on non-  
3 conscious automatic processes.

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## Background

Alcohol consumption is responsible for 3.2% of worldwide deaths and is ranked fourth in terms of disability adjusted life years (1). Accordingly, reducing alcohol consumption is a public health priority, particularly in groups where excessive alcohol consumption appears most problematic (e.g., young adults, sport participants) (2). Despite evidence showing that direct alcohol sponsorship of sports participants is associated with more hazardous drinking (2, 3), and that large numbers of children are exposed to alcohol sponsorship messages when watching sport (4), the alcohol industry remains a leading sponsor of sport, accounting for 20% of all sport sponsorships (4,5). The frequent incidental and/or unattended exposures to brands and branded products such as alcohol, are difficult to consciously process and are therefore difficult to consider and critically assess/filter in a deliberative manner (6,7). Research already shows that brand recall is higher when branding (e.g., banners, logos) have been visually present for a long period of time (7), and when the frequency of exposure is high (8). However, frequent incidental and unattended brand exposures (e.g., branding on stadium signage) may have a similar impact on brand memory and attitudes to the branded product (e.g., Heineken Beer), through unconscious or implicit processing. Because advertising stimuli are generally presented peripherally to the in-game action (i.e., the sporting event), two questions arise: (i) does processing of this type of advertising incur cognitive costs? and (ii) does attitude change toward a brand automatically generalizes – or “spillovers”- to a broader category of stimuli, that is, alcohol?

There is indeed recent experimental data that have shown that incidental exposure to alcohol sponsorship and associated messages in sporting contexts influences indirect measures of attitudes (i.e., relatively automatic and nonconscious evaluations) toward the

1 sponsor's alcohol brand, and to some extent toward alcohol generally (9). However, the  
2 question of *how* sponsorship influence occurs remains of primary relevance for public  
3 health, as it informs us of the potential impact of large advertising campaigns on attitudes  
4 toward alcohol and consumption when they are based on implicit and involuntary processes.  
5 Since indirect measures of attitudes are excellent predictors of alcohol consumption (10)  
6 and predict unique variance compared to direct measures (11), this paper aims to illuminate  
7 whether the effects of alcohol sponsorship on these alcohol-related attitudes can occur  
8 completely automatically, or, on the contrary, would be mediated by deliberative processes.  
9 Second, we examined whether changing attitudes towards a specific brand would have an  
10 impact on the general concept of alcohol (i.e., spillover).

## 11 **To What Extent Does the Viewer Voluntarily Process Advertising and Branding** 12 **Stimuli Onscreen?**

13 As mentioned above, promotion of alcohol products is sometime found in contexts where  
14 one would a priori expect it not to be there. Even outside stadiums, exposure to advertising  
15 in US urban areas show a link between exposure to alcohol in the media and an increase in  
16 alcohol consumption, while lowering the age at which children and adolescents are likely to  
17 start drinking (12). It is therefore essential to identify the processes that will lead individuals  
18 to drink alcohol, as to develop prevention and intervention procedures that will limit the  
19 harmful consequences and costs for public spending.

20 It has been argued that branded promotion incidentally presented during an event are likely  
21 to be more effective than regular advertising due to a strong emotional and cognitive  
22 engagement of the viewer toward the event (13). On the other hand, several studies showed  
23 that individuals under cognitive load (i.e., performing a demanding, secondary task, while  
24 doing a primary task) would be *less* sensitive to external influences (e.g., 14). This suggests

1 that to be effective, advertisement would *require* cognitive resources. One of the central  
2 issues is therefore whether encoding depends upon conscious engagement into brand  
3 memorization and attitude change.

4 **Under Which Conditions Does Exposure to Sponsor Brands and Advertising Lead to**  
5 **Broader Conceptual Generalizations? Spillover Effect from a Brand to a Broader**  
6 **Category.**

7 From a cognitive point of view, recent data have highlighted that the evaluation of a single  
8 stimulus can be generalized to a broader category of stimuli if it shows salient cues of  
9 membership of this category, and when the number of distracting stimuli is not too high as  
10 to allow the relevant indices to be treated (15). Therefore, during the formation of the  
11 evaluation, the initial emotional reaction should be transferred not only to the target (i.e., the  
12 brand Heineken), but also to a superordinate category related to the brand (e.g., alcohol,  
13 beer). In order to maximize the effects of evaluative learning from a stimulus toward a  
14 general category, the alcohol brand must have strong associations in memory with the  
15 superordinate concept through links with affective, perceptual and sensory-motor  
16 components (16). Therefore, attitude change toward prototypical, well-known, exemplars of  
17 a category should lead to a stronger generalization to other exemplars of this category, and  
18 the category itself.

19 **Introduction and hypothesis.**

20  
21 **Manipulation of cognitive resources**

22 We aimed, first, to determine whether sponsor branding influence on participant's attitudes  
23 incurs effortful cognitive activity. In this study, we reduced participants' abilities to draw on

1 self-regulatory resources *prior to viewing* the excerpts by using an ego-depletion task. An  
2 ego-depletion task typically consists in reducing volitional processing at time 2 (here,  
3 exposure to sponsorship) by asking the participant to perform a cognitively demanding task  
4 at time 1 (17). Recent conceptualization has shown that impairing self-control tends to also  
5 reduce executive and cognitive control in a broader sense, which is particularly efficient on  
6 tasks requiring motivation to engage in a task requiring some amount of mental effort (18,  
7 19, 20). Furthermore, impairing self-regulation is close to what an individual might  
8 experience as external pressures in daily life situations, in which one is more likely to have  
9 limited resources to and be targeted by multiple external demanding tasks that hinder self-  
10 control.

### 11 **Manipulation of the Spillover Effect**

12 Second, we hypothesize that the more representative the brand is of the alcohol concept in  
13 memory, the more the latter will be activated, and the stronger the 'spillover' effect.  
14 Evaluative change toward a single stimulus can be generalized to a category of stimuli if it  
15 shows clear evidence of belonging to a broader category when the number of distracting  
16 stimuli is not too high to allow relevant cues to be processed. In order to maximize the  
17 effects of associative learning from a stimulus to a general category (i.e., spillover), the  
18 stimulus must have strong associations in memory with the overordered concept, i.e., the  
19 more the participant experiences it, the stronger the spillover effect will be. Therefore,  
20 participants were exposed to (i) sport excerpts for the “Heineken” brand (very prototypical  
21 for French participants) or (ii) the “Steinlager” brand (a New Zealand beer brand, not  
22 prototypical for French participants) or (iii) the “Castrol Edge” brand (unrelated to alcohol).  
23 We predict that indirect measures of attitudes toward alcohol *in general* should be more



1 positive for individuals exposed to the “Heineken” brand compared to the “Steinlager”  
2 brand and “Castrol Edge”.

### 3 **Methods**

#### 4 **Participants & Setting**

5 Students ( $n=109$ ) from a French university ( $M_{age}= 20.24$ ;  $SD_{age} = 2$ ; women = 75 %) were  
6 recruited through advertising on campus for a 30 minutes group experiment in exchange for  
7 £10. Our only *a priori* selection criterion was to exclude participant with fluent knowledge  
8 of Chinese or Japanese in order not to bias results from the indirect measures.

#### 9 **Procedure & Trial Design**

10 Participants went through group sessions in a room with 12 computers. Each participant was  
11 separated from each other by wooden partitions and wore insulating headphones.

12 Participants were initially greeted by the experimenter and then randomly assigned to a 2  
13 (depletion: yes vs no) x 3 (brand: “Heineken” vs “Steinlager” vs “Castrol Edge”) factorial  
14 design. After performing the self-control (i.e., depletion) stage, participants were randomly  
15 assigned to one of the three experimental groups containing the sponsors branding for  
16 “Heineken”, the “Steinlager” or “Castrol Edge” in order to manipulate the spillover effect.

17 Participants were then asked to complete indirect (implicit) and direct (explicit) measures of  
18 attitudes towards alcohol and the brands to which they were exposed. Participants then filled  
19 the Sport Spectator Identification Scale (i.e., reported level of felt closeness to the team; 21),  
20 the Involvement in the Message Scale (i.e., reported degree to which the participant  
21 consciously treated the messages, 22), and a Transportation in the Event Scale (i.e., reported  
22 cognitive and emotional involvement toward the event, 23). Participants finally filled the  
23 Perceived Awareness of Research Hypothesis, during which they were debriefed (PARH;

1 24). Both the experimenter and participant were blind to the conditions. All randomizations  
2 were done by the Inquisit 4 algorithm for randomization.

### 3 **Material**

4 *Video excerpts.* Each participant was exposed to 10 minutes of high definition video footage  
5 of a rugby match reflecting their assigned sponsorship condition. Within each sponsorship  
6 condition, participants were randomly assigned one of 3 possible excerpts of the same  
7 match to watch. The « eHei » condition comprised an excerpt of the final contest of the  
8 Heineken Cup between Leinster and Northampton containing numerous occurrences of  
9 sponsorship for the Heineken brand (e.g., banners, logo displayed on players, referee  
10 uniform and on the field). We edited the video so that the Heineken brand was always  
11 clearly visible onscreen during the 10-minute excerpt. The excerpts in the « eStein »  
12 condition were taken from the match between New-Zealand and England of the Steinlager  
13 series in 2014. In the no alcohol-sponsorship condition, excerpts from another rugby contest  
14 (semi-finals of the 2013 rugby championship between Australia and South Africa) were  
15 used containing sponsorship for a brand not related to alcohol (Castrol Edge).

16 *Ego-depletion task.* We used an attentional control task as an ego-depletion induction (total  
17 length = 7 minutes) in which participants had to pay attention to a video showing a woman  
18 being interviewed. Half of the participants were instructed to ignore distractor words  
19 appearing in the bottom right of the screen and therefore to regulate their attention (i.e.,  
20 depletion group) while the other half did not receive any instruction regarding the  
21 distractors (i.e., control group).

22 *Affect Misattribution Procedure (standard).* Attitudes can be measured by direct - or  
23 explicit - attitudinal measures, which involves directly asking the participant to provide an  
24 evaluation of the attitudinal object. Researchers can also assess attitudes and other

1 constructs using indirect or implicit measures whereby a person's attitudes or preferences,  
2 sometimes unconscious, towards a target or object is assessed by tapping into subtler and/or  
3 automatic/uncontrolled processes using timed reaction tasks and tasks such as the implicit  
4 association task. We used the Affect Misattribution Procedure (hence, AMPs) as an indirect  
5 measure of attitudes toward the sponsored brands and alcohol (25). Participants were  
6 warned that a picture would appear briefly on the screen and that it would be immediately  
7 replaced by a Chinese pictogram, which would disappear quickly (both staying onscreen for  
8 100ms, with a 75ms interval between the two stimuli). Once the Chinese pictogram  
9 disappeared, it was replaced by a mask (i.e., noise) until the participant gave his answer.  
10 The participant was instructed to ignore the first picture and evaluate whether the Chinese  
11 pictogram seemed more or less pleasant than the average Chinese pictogram, on a scale  
12 from 1 (very unpleasant) to 4 (very pleasant). The pictogram being a neutral, unvalenced  
13 stimulus, the evaluation elicited by the picture has been shown to be misattributed to the  
14 pictogram (25). Hence, the participant's attitude towards the image is evaluated indirectly  
15 from his response to the pictogram.

16 The task comprised 106 trials, in which the pictures were 20 generic and unbranded alcohol  
17 and water bottle pictures (10 of each category), 20 filler pictures (depicting food and  
18 furnitures), 12 branded alcohol pictures (26), comprising a picture of an "Heineken" bottle  
19 and a "Steinlager" bottle and a neutral grey square as a neutral stimulus.

20 *Affect Misattribution Procedure (modified)*. A modified version of the AMP was used as a  
21 direct measure of attitude, to avoid variations in answers that could be attributed to  
22 variations in structural features of the tasks (e.g., nature of the stimuli, proposition vs  
23 pictures, Likert scales vs reaction times; for a more detailed discussion, see 27). In the  
24 modified AMP, the structure of the task remained the same, except that participants have to

1 evaluate the picture and not the pictogram. The evaluation of the picture is done *directly* by  
2 the participant, rather than inferred via his evaluation of the Chinese pictogram.

3 *Sport Spectator Identification Scale (SSIS)*. We used the 8-item Sport Spectator  
4 Identification Scale to assess participant's degree of identification toward the athletes and  
5 the sports team (18; see Appendix A2).

6 *Involvement in the Message Scale (IMS)*. We used a five-item scale assessing conscious and  
7 effortful processing messages presented during the match (19; See Appendix A1)

8 *Transportation in the Event Scale*. Transportation has been originally defined as a one's  
9 emotional and cognitive involvement in a fictional narrative (e.g., emotional engagement).  
10 Feeling transported in a narrative makes judgments toward the characters and the fiction in  
11 general more positive (23). Here, we checked whether the branding stimuli (i.e., banners in  
12 stadiums, logos displayed on athletes etc.) would be associated with the evaluative response  
13 elicited by the event and moderate the effect of incidental exposure to sponsor's  
14 branding/advertising. We used a modified 7 item Transportation Scale for sport events in  
15 order to evaluate participants' degree of emotional involvement toward the event (see  
16 Appendix A3).

## 17 **Results**

18 *Reliability of Self-Report Scales*. Self-reported measures had a good reliability overall  
19 (Transportation in the Event Scale,  $\alpha = .80$ ; Involvement in the Message Scale,  $\alpha = .71$   
20 (Item 5 was removed from the scale, with item 5:  $\alpha = .19$ ); Sport Spectator Identification  
21 Scale,  $\alpha = .84$ ). We did not find any significant difference on these variables across the  
22 « eHei », « eSteI » et « eNA » groups (see table 1a), nor any differences between gender in  
23 overall involvement in sport (see Table 1b and 1c). We found a significant, medium-sized  
24 positive correlation between the Transportation and SSIS,  $r = 0.43$ ,  $p < .001$ .

## 1 *Main Analysis*

2 A 2 (ego depletion: depleted vs control) x 3 (brand exposure) ANCOVA with  
3 Transportation, Involvement in the Message and Sport Spectator Identifications scales  
4 entered as covariates and with all interactions was conducted to assess effects on indirect  
5 (Model 1) and direct measures (Model 2).

6 *Model 1: Effect of exposure to the « Heineken » brand on indirect measures of attitudes*  
7 *toward « Heineken ».* We found a nonsignificant main effect of exposure to the  
8 « Heineken » brand compared to other brands, showing more positive attitude scores on  
9 indirect measures,  $F(1, 70) = 3.50, p = .065, \eta^2 = .047$ . We also found a nonsignificant  
10 moderating effect of depletion on exposure,  $F(1, 70) = 2.76, p = .10, \eta^2 = .03$ , as well as an  
11 interaction trending toward significance between exposure and IMS scores, suggesting that  
12 the less participants engaged in conscious processing of the effect, the more positive the  
13 indirect measure scores were,  $F(1, 70) = 3.19, p = .07, \eta^2 = .019$  (see table 2 for descriptive  
14 statistics (three participants not included of their high Cook values (2.63 and 0.47, next  
15 being 0.08) and Deleted Studentized Residual (4.41)).

16 *Effect of exposure to the « Heineken » brand on indirect measures of attitudes toward*  
17 *Alcohol.* Alcohol-related scores were computed by averaging scores on all alcohol stimuli  
18 that were unrelated to the exposed brands. Our hypothesis being that exposure to a  
19 prototypical brand would have a greater impact on attitudes toward alcohol than a non-  
20 prototypical brand, we tested a linear contrast opposing participants who were exposed to a  
21 prototypical brand (i.e., "Heineken") vs. a non-prototypical brand (i.e., "Steinlager") vs. no  
22 alcohol advertising. We found a significant linear trend showing that being in the « eHei »  
23 group compared to the « eSte » and « eNa » groups led to more positive scores on indirect  
24 measures toward alcohol,  $F(2, 57) = 5.87, p = .004, \eta^2 = .059$ . No significant effect was

1 found for the quadratic term ( $p = .34$ ). Contrast analysis revealed that the increase from  
2 “eHei” to “eSteI” ( $M_{diff} = 4.46$ ) was not statistically significant ( $p = .45$ ), but the increase  
3 from “eHei” to “eNa” ( $M_{diff} = 14.49$ ,  $p = .005$ ) was significant, and nor did the change from  
4 “eSteI” to “eNa” ( $M_{diff} = 10.02$ ,  $p = .01$ , see Figure 1).

5 Planned contrast analysis comparing the « eHei » and « eSteI » groups to the « eNA » group  
6 shows that mere exposure to alcohol sponsorship has a significant effect on indirect  
7 measures of attitudes toward alcohol,  $F(1, 73) = 4.65$ ,  $p = .034$ ,  $\eta^2 = .038$ . We did not find  
8 any moderating effect of depletion,  $F(1, 73) = 0.01$ ,  $p = .91$ ,  $\eta^2 < .001$ , but, again, a  
9 significant moderating effect of conscious processing of the message,  $F(1, 73) = 5.20$ ,  $p =$   
10  $.02$ ,  $\eta^2 = .04$ , indicating that weaker conscious involvement in processing the messages lead  
11 to more positive indirect measures of attitudes toward alcohol for the « eHei » group  
12 compared to the « eSteI » and « eNA » groups.

13 *Model 2: Effect of exposure to the « Heineken » brand on direct measure of attitudes*  
14 *toward « Heineken » and Alcohol.* There was no significant change on direct measures of  
15 attitudes toward « Heineken » in the « eHei » group compared to the pooled scores of the  
16 two other groups as well as no moderating effect of depletion ( $p > .63$ ), (see table 3 for  
17 descriptive statistics) and no significant change in direct measures toward alcohol in the  
18 « eHei » group compared to the pooled scores of the two other groups and no moderating  
19 effect of depletion ( $ps > .66$ ), that is no effect of the exposure to the “Heineken” brand on  
20 direct measures toward alcohol in general..

21 *Hypothesis Awareness.* Introducing PARH scores as covariates did not change significantly  
22 our estimates as well as removing participants above 3 standard deviations on the PARH  
23 scores (20).

## 24 **Conclusion & General Discussion**

1 As predicted, we found that exposing participants to the “Heineken” brand led to more  
2 positive attitudes, as measured by indirect measures, toward the brand “Heineken”  
3 immediately after the watching the video. This is consistent with previous work in this area  
4 (9). Similarly, we found that exposing participants to an alcohol brand, and more strongly to  
5 a prototypical alcohol brand, leads to more positive attitudes toward alcohol more generally.  
6 Crucially, we found no moderating effect of ego-depletion. This suggest that at least in the  
7 context of sponsorship; attitude change can occur without deliberate involvement in  
8 processing the ads. Moreover, the less one reported being motivated to engage in conscious  
9 and deliberate processing of the advertising messages onscreen, the more positive the  
10 attitudes on indirect measures toward the “Heineken” brand and alcohol were. This is also  
11 confirmed by the consistent effect of alcohol brand/advertising exposure on indirect  
12 measures compared to direct measures, with indirect measures being more suited to capture  
13 automatic evaluative responses, while direct measures are more sensitive to deliberate and  
14 consciously formed responses (28). Our results suggest that sponsorship exposure may  
15 change attitudes in an automatic fashion, at least in the sense that is does not require the  
16 participant to have cognitive resources available to engage in volitional processing of the  
17 advertising stimuli. Eventually, we found evidence for the spillover (i.e., generalisation)  
18 effect of attitude change only when the sponsored brand was prototypical of the alcohol  
19 category, but not when the alcohol brand was relatively unknown of the participant or was  
20 unrelated to alcohol.

### 21 **Implication for alcohol consumption & concluding remarks**

22 Because implicit associations with alcohol are one of the most reliable predictors of alcohol  
23 consumption, and have a better predictive value than self-reported measures, especially  
24 among individuals with low cognitive resources (29) and due to the massive exposure of

1 sport-related content on TV in the daily lives of millions of individuals on the globe, one  
2 could assume that repeated exposure to alcohol sponsorship should have long-term effects  
3 on actual drinking behaviors, even on individuals who are passively exposed to advertising  
4 stimuli, thus making the question of how to resist those influences more complex.  
5 Unfortunately, we were unable to collect data on participants' consumption after the  
6 experiment. Beyond the ethical problems (i.e., a potential rise in immediate alcohol  
7 consumption), we may not have found any substantial changes on actual consumption,  
8 given the subtle nature of the processes involved in such a short exposure time. However,  
9 cohort studies have already made it possible to establish the link between exposure to media  
10 content (i.e., films, TV show or advertisements) containing alcohol on drinking behavior,  
11 particularly among children and adolescents (30, 31). These studies were mainly  
12 correlational, and rarely differentiated between the different forms of exposure to  
13 advertising (e.g., incidental vs explicit), although some quasi-experimental studies have  
14 focused on studying the impact of explicit advertisements on alcohol consumption (32).  
15 However, our results still need to be replicated in order to estimate the magnitude of our  
16 effects on actual consumption.

17 A limitation of our study is that we did not evaluate the impact of exposure to sponsorship  
18 on maintaining long-term implicit attitudes. Some studies (33) have shown that attitudes  
19 acquired so via implicit processes are more resistant to change and are more stable over  
20 time. Hence, more concerning to us is the global impact on Public Health. Dual processes  
21 models of addictive behaviors predict that indirect measures of attitudes are better predictors  
22 of drinking for individuals that bear low executive functions (34). Determining the duration  
23 of the effect of exposure to brand sponsorship on attitudes over time would provide



1 additional proof as to the implicit nature of the formation of attitudes. More specific studies  
2 on this aspect are necessary and should be conducted in the future.

3 Our results converge with observational studies: there is indeed a positive and causal link  
4 between exposure to alcohol sponsorship and alcohol-related attitudes, which doesn't  
5 necessarily incur cognitive resources. What we showed is that alcohol sponsorship not only  
6 sends a message directly encouraging people to drink but tends to implicitly associate a  
7 product with a specific context and milieu (i.e., casual and desirable, etc.) in which alcohol  
8 is consumed.

9 Such sponsorship campaigns are not conducted in vain. According to a study on the impact  
10 of advertising budgets on downstream alcohol consumption proposing a mathematical  
11 model of consumption data and advertising from the industry, Woodside (35) showed that,  
12 in a 20 years period, a 1% increase in investment in advertising messages promoting  
13 distilled alcohol increased the amount of alcohol consumed by 0.15% in the general  
14 population. Similarly, a 1% increase in spending on advertising for beer brands increased  
15 the total alcohol consumed by 0.25%. From another perspective, these data also provide  
16 insight into the potential effectiveness of prevention campaigns based on message display.  
17 If sponsorship of alcohol-related messages does impact people's preferences automatically-  
18 and unintentionally- then this reasoning can also be applied to prevention messages.

19 However, this does not tell us how more complex characteristics of the advertising stimulus  
20 are treated (e.g., verbal content, explicit information such as slogan, compared to mere  
21 perceptual elements). One possibility would be to test how sponsorship elements containing  
22 elements relating to alcohol brands and verbal elements aimed at prevention interact to  
23 change alcohol-related attitudes and behaviors (e.g., Carlsberg banner with the message  
24 "drink responsibly").

1 Overall, this makes the question of how to resist those influences all the more central. For  
2 example, if sponsorship influence occurs through misattributing the affect elicited by  
3 retrieval to the product (36), simple strategies such as focusing, or even assessing the  
4 presence of the brands and logos could help reduce the impact of sponsorship on implicit  
5 attitudes. Identifying the processes by which implicit attitudes are formed could also help to  
6 inform policy decisions.

## 7 **References**

- 8 1. World Health Organization (2014). 2012 Global Status Report on Alcohol and Health.  
9 Retrieved from  
10 [http://apps.who.int/iris/bitstream/10665/112736/1/9789240692763\\_eng.pdf?ua=1](http://apps.who.int/iris/bitstream/10665/112736/1/9789240692763_eng.pdf?ua=1)
- 11 2. O'Brien KS, Kypri K. Alcohol industry sponsorship and hazardous drinking among  
12 sportspeople. *Addiction* (Abingdon, England), 2008;103(12), 1961–6.
- 13 3. O'Brien KS, Miller PG, Kolt GS, Martens MP, Webber A. Alcohol industry and non-  
14 alcohol industry sponsorship of sportspeople and drinking. *Alcohol Alcoholism* (Oxford,  
15 Oxfordshire), 2015;46(2), 210–3.
- 16 4. O'Brien K, Carr SM, Ferris J, Room R, et al. Alcohol advertising in sport and non-sport  
17 TV in Australia during children's viewing times. *PLoS ONE* 2015;10(8): e0134889.
- 18 5. Maher A, Wilson N, Signal L, Thomson G. Patterns of sports sponsorship by gambling,  
19 alcohol and food companies: an Internet survey. *BMC Public Health*, 2006;6, 95.
- 20 6. Rehm, J., & Kanteres, F. (2008). Alcohol and sponsorship in sport: some much-needed  
21 evidence in an ideological discussion. *Addiction*, 103, 1967–1968.
- 22 7. DeMars, T. R. & Robinson, T. E. (1998). Stadium signs on television: The television  
23 viewers recall of in-stadium advertisements during a televised sporting event. *Proceedings*

- 1 of the 1998 Annual Meeting of the Association of Marketing Theory and Practice, 7, 250-  
2 255.
- 3 8. Correia, A. (2014). Sponsorship effectiveness in professional sport: an examination of  
4 recall and recognition among football fans. *International Journal of Sports Marketing &*  
5 *Sponsorship*, (October), 7–24.
- 6 9. Zerhouni O, Bègue L, Duke AA, Flaudias V. Dynamic exposure to alcohol advertising in  
7 a sports context influences implicit attitudes. *Alcohol Clin Exp Res*, 40(2), 422–428.
- 8 10. Wiers RW, Gladwin TE, Hofmann W, Salemink E, Ridderinkhof KR. Cognitive Bias  
9 Modification and Cognitive Control Training in Addiction and Related Psychopathology:  
10 Mechanisms, Clinical Perspectives, and Ways Forward. *Clin Psychol Sci*, 2013;1, 192–212.
- 11 11. Rooke SE, Hine DW, Thorsteinsson EB. Implicit cognition and substance use: a meta-  
12 analysis. *Addict Behav*, 2008 ;33(10), 1314–28.
- 13 12. Anderson P, De Bruijn A, Angus K, Gordon R, Hastings G. Special issue: The message  
14 and the media: Impact of alcohol advertising and media exposure on adolescent alcohol use:  
15 A systematic review of longitudinal studies. *Alcohol Alcohol*. 2009;44(3):229-243.
- 16 13. Harvey B, Gray S, Despain G. Measuring the effectiveness of true sponsorship. *J*  
17 *Advertising Res*, 2006;46(4), 398-409.
- 18 14. Pleyers G, Corneille O, Yzerbyt V, Luminet O. Evaluative conditioning may incur  
19 attentional costs. *J Exp Psychol. Anim B*, 2009;35(2), 279–85.
- 20 15. Hütter M, Kutzner F, Fiedler K. What is learned from repeated pairings? On the scope  
21 and generalizability of evaluative conditioning. *J Exp Psychol Gen*, 2014;143(2), 631–43.

- 1 16. Schröder T, Thagard P. The affective meanings of automatic social behaviors: three  
2 mechanisms that explain priming. *Psychol Rev*, 2013;120(1), 255–80.
- 3 17. Hansen AL, Johnsen BH, Thayer JF. Vagal influence on working memory and attention.  
4 *Int J Psychophysiol*, 2003;48(3), 263–274.
- 5 18. Hofmann W, Schmeichel BJ, Baddeley AD. Executive functions and self-regulation.  
6 *Trends Cog Sci*, 2012;16(3), 174–180.
- 7 19. Hagger MS, Wood C, Stiff C, Chatzisarantis NLD. Ego depletion and the strength  
8 model of self-control: a meta-analysis. *Psychol Bull*, 2010;136(4), 495–525.
- 9 20. Dang, J, Liu, Y, Liu, X, & Mao, L. (in press). The ego could be depleted, providing  
10 initial exertion is depleting: A pre-registered experiment of ego depletion. *Soc Psychol*
- 11 21. Wann DL, Branscombe NR. Sports fans: Measuring degree of identification with their  
12 team. *Int J Sport Psychol*, 1993;24(1), 1-17.
- 13 22. Wheeler SC, Petty RE, Bizer GY. Self-schema matching and attitude change:  
14 Situational and dispositional determinants of message elaboration. *J Cons Res*, 2005;31(4),  
15 787-797.
- 16 23. Green MC, Brock TC. The role of transportation in the persuasiveness of public  
17 narratives. *J Pers Soc Psychol*, 2000;79, 701–721.
- 18 24. Rubin M, Paolini S, Crisp RJ. A processing fluency explanation of bias against  
19 migrants. *J Exp Soc Psychol*, 2010;46, 21-28.
- 20 25. Payne BK, Govorun O, Arbuckle NL. Automatic attitudes and alcohol: Does implicit  
21 liking predict drinking? *Cog Emo*. 2008 ;22.

- 1 26. Pronk T, Van Deursen D, Beraha E, Larsen H, Wiers RW. Validation of the Amsterdam  
2 Beverage Picture Set: a Controlled Picture Set for Cognitive Bias Measurement and  
3 Modification Paradigms. *Alc Clin Exp Res*. 2015.
- 4 27. Payne BK, Burkley MA, Stokes MB. Why do implicit and explicit attitude tests  
5 diverge? The role of structural fit. *J Pers Soc Psychol*, 2008;94(1), 16–31.
- 6 28. Gawronski B, Bodenhausen GV. Implicit and Explicit Evaluation: A Brief Review of  
7 the Associative – Propositional Evaluation Model. *Soc Pers Psychol Comp*, 2014;8(8), 448–  
8 462.
- 9 29. Stacy, AW, & Wiers, RW. Implicit cognition and addiction : a tool for explaining  
10 paradoxical behavior. *Ann Rev Clin Psychol*, 2010, 6, 551–75.
- 11
- 12 30. Dal Cin S, Worth K a, Gerrard M, et al. Watching and drinking: expectancies,  
13 prototypes, and friends’ alcohol use mediate the effect of exposure to alcohol use in movies  
14 on adolescent drinking. *Health Psychol*. 2009;28(4):473-483.
- 15 31. Koordeman R, Anschutz DJ, Engels RCME. Exposure to alcohol commercials in movie  
16 theaters affects actual alcohol consumption in young adult high weekly drinkers: an  
17 experimental study. *Am J Addict*. 2011;20(3):285-291.
- 18 32. Sweldens S, Van Osselaer SMJ, Janiszewski C. Evaluative Conditioning Procedures and  
19 the Resilience of Conditioned Brand Attitudes. *J Cons Res*, 2010;37(3), 473–489.
- 20 33. Wiers RW, Gladwin TE, Hofmann W, Salemink E, Ridderinkhof KR. Cognitive Bias  
21 Modification and Cognitive Control Training in Addiction and Related Psychopathology:  
22 Mechanisms, Clinical Perspectives, and Ways Forward. *Clin Psychol Sci*. 2013;1:192-212.

- 1 34. Friese M, Gianotti LRR, Knoch D. The Association Between Implicit Alcohol Attitudes  
2 and Drinking Behavior is Moderated by Baseline Activation in the Lateral Prefrontal  
3 Cortex. *Health Psychol*, 2016. 35(8).
- 4 35. Woodside AG. Advertising and Consumption of Alcoholic Beverages. *J Consum Res*,  
5 1999; 8(2), 167–186.
- 6 36. Fang X, Singh S, Ahluwalia R. An examination of different explanations for the mere  
7 exposure effect. *J Consum Res*. 2007;34(June).

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#### **Abbreviations**

- 10 Participants exposed to the « Heineken » brand : eHei  
11 Participants exposed to the « Steinlager » brand : eStein  
12 Participants exposed to the « Castrol Edge » brand : eNA  
13 Involvement in the Message Scale: IMS  
14 Sport Spectator Identification Scale: SSIS  
15 Affect Misattribution Procedure: AMP

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#### **Declaration**

#### **Competing Interests**

18 We have read and understood BMC Public Health policy on declaration of interests and  
19 declare that we have no competing interests.

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5 publication.

#### 6 **Ethics approval and consent to participate**

7 All procedures performed in studies involving human participants were in accordance with  
8 the ethical standards of the institutional and/or national research committee and with the  
9 1964 Helsinki declaration and its later amendments or comparable ethical standards. We  
10 cannot provide a name of the ethical committee that approved this study since no ethical  
11 committee existed at University Grenoble-Alpes when the studies were conducted.

12 Informed consent was obtained from all participants and none chose to withdraw from the  
13 procedure.

#### 14 **Informed consent**

15 Informed consent was obtained from all individual participants included in the study.

#### 16 **Consent for publication**

17 Not applicable

#### 18 **Availability of data and material**

19 All raw data and material (i.e. videos, Inquisit scripts and stimuli) could be obtained by  
20 contacting the corresponding author (Oulmann Zerhouni).

#### 21 **Authors' contributions**

22 All authors made substantial contribution to the paper. OZ designed and conducted the two  
23 studies in collaboration with LB and conducted all data analysis. KB greatly helped in

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2 read and approved the final manuscript.

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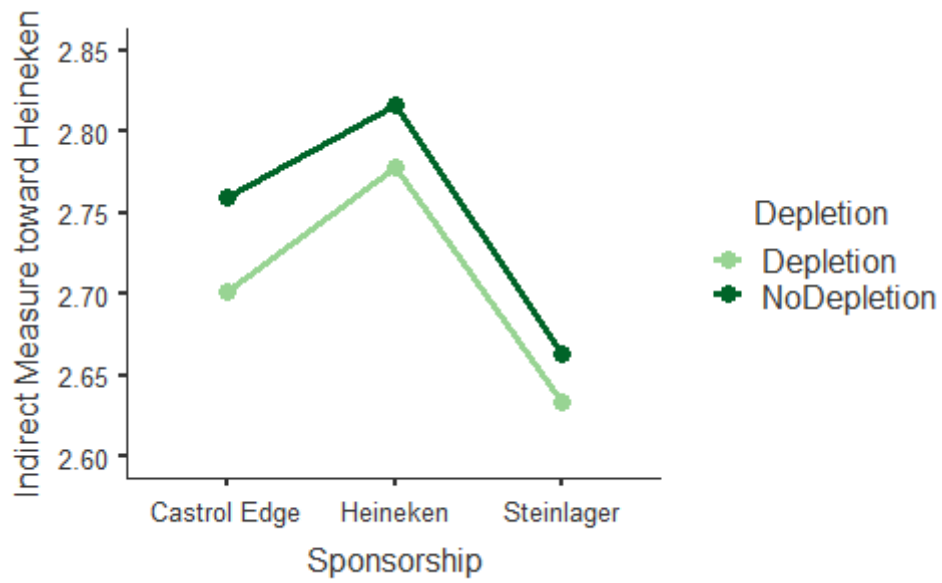
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2 *Figure 1. Indirect measures toward the Heineken brand depending on type of sponsorship*

3 *exposure and depletion*