Short Communication

Using the Extrinsic Affective Simon Test as a measure of implicit attitudes towards alcohol: Relationship with drinking behavior and alcohol problems

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Abstract

In apparent contrast to the alleged importance of positive alcohol expectancies in alcohol (ab)use, a series of studies using the Implicit Association Test (IAT; [Greenwald, A. G., McGhee, D. E., & Schwartz, J. L. K. (1998). Measuring individual differences in implicit cognition: The Implicit Association Test. Journal of Personality and Social Psychology, 74, 1464–1480]), found that heavy and light drinkers display more negative implicit attitudes toward alcohol than toward sodas (e.g., [Wiers, R. W., van Woerden, N., Smulders, F. T. Y., & de Jong, P. J. (2002). Implicit and explicit alcohol-related cognitions in heavy and light drinkers. Journal of Abnormal Psychology, 111, 648–658]). One explanation for this might be that the negative-alcohol IAT effect reflects an artifact of the IAT procedure and are due to its relative nature and/or its sensitivity to task recoding strategies. Therefore, the present study used a non-relative measure that has been argued to be robust against participants’ task recoding strategies (Extrinsic Affective Simon Test; EAST, [De Houwer, J. (2001). A structural and process analysis of the Implicit Association Test. Journal of Experimental Social Psychology, 37, 443–451]) to test heavy (n = 16) and light (n = 16) drinkers’ automatic affective associations with alcohol and sodas. Heavy and light drinkers displayed clear positive associations with sodas and neutral (or ambivalent) automatic associations with alcohol. Importantly, positive automatic alcohol associations predicted unique variance of alcohol (mis)use and was the single best predictor of individuals’ alcohol problems, underlining the idea that they do play a role in alcohol (mis)use. © 2006 Elsevier Ltd. All rights reserved.
Insight in people’s automatic associations may help explaining the irrational aspects of addictive behaviors. Automatic associations are assumed to be related to relatively spontaneous responses, whereas deliberated associations are assumed to be related to more controlled responses (Wilson, Lindsey, & Schooler, 2000). In the absence of sufficient cognitive resources and/or motivation to control, automatic associations are also assumed to determine controllable behaviors. Following this, positive automatic associations may become highly dysfunctional as they may trigger impulsive approach behavior although the individual knows the stimulus is in fact harmful.

In apparent contrast to the alleged importance of positive expectancies in motivating alcohol abuse, a series of studies using the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998), found that heavy (and light) drinkers display more negative implicit attitudes toward alcohol than toward sodas (De Houwer, Crombez, Koster, & De Beul, 2004; Wiers, van Woerden, Smulders, & de Jong, 2002). Yet, given its relative nature, the alcohol–soda IAT may at least partly reflect positive associations toward sodas rather than negative associations toward alcohol. Moreover, research investigating the underlying mechanisms of the IAT provided evidence to suggest that the negative alcohol IAT effects may reflect non-associative factors (e.g., salience asymmetries) rather than affective associations (Houben & Wiers, in press). Thus, the earlier findings may well underestimate the actual importance of positive implicit associations in alcohol misuse. Therefore, this study used the Extrinsic Affective Simon Test (EAST; De Houwer, 2001), a non-relative measure designed to assess associations with singular targets and arguably less sensitive to non-associative factors like salience asymmetries. We separately tested heavy and light drinkers’ automatic associations with alcohol and sodas, and examined the predictive validity of positive automatic associations for (retrospective) alcohol misuse.

1. Method

1.1. Participants and assessments

Participants were 16 heavy drinking students (11 women; alcohol use: M=30.0 standard servings per week, S.D.=18.5; alcohol problems: M=12.4, S.D.=6.4) and 16 light drinkers (11 women; alcohol use: M=6.5 standard servings per week, S.D.=4.8; alcohol problems: M=4.1, S.D.=4.6). Mean age was 20.3 years (S.D.=1.8). Alcohol use was assessed using the timeline follow-back method (Sobell & Sobell, 1990). Alcohol-related problems were assessed with the 18-item Rutgers Alcohol Problem Index (RAPI;
White & Labouvie, 1989). The lay-out and experimental procedure of the present Extrinsic Affective Simon Test (EAST) are very similar to the IAT. For the outline of the task see Table 1.

The attribute categories and exemplars were identical to the IAT used by Wiers et al. (2002). Yet, the target categories were now the neutral categories ‘solid’ and ‘fluid’ rather than ‘soda’ and ‘alcohol’. The crucial ‘fluid’ category consisted of the 5 alcoholic and the 5 non-alcoholic drinks used in the previous studies. The ‘solid’ category consisted of 10 exemplars of food items. Exemplar words were presented randomly in the middle of a screen (ITI 250ms). Participants sorted the words as fast as possible to the category names displayed in the left and right corners by pressing the ‘P’ or the ‘Q’.

Phases 1, 2, 4, 6, and 8 were practice stages. During the critical test phases (3, 5, 7, and 9) participants sorted alternately target and attribute stimuli. For half of the test phases alcohol and soda shared the response button with positive, and for the other half with negative attributes. The word ‘fault’ appeared following an incorrect response. To index specific attitudes, we used 100mm Visual Analogue Scales (VAS) asking for each of the stimuli to what extend they matched with positive (0=not at all, 100=very good) or with negative. To assess their global attitudes toward alcohol (and sodas), participants indicated for each of the positive and negative attributes whether they considered the drinking of alcoholic drinks (and soda’s) to be pleasant, etc., using VASs ranging from 0 (=disagree) to 100 (=agree).

2. Results

2.1. Specific explicit attitudes

A 2 Drink×2 Valence×2 Group ANOVA showed a Drink by Valence interaction \[F(1,30)=59.4, p<.05\], indicating that participants considered soda as more positive than alcohol (see Table 2). This was similar for both groups \[F(1,30)<1\]. Subsequent \(t\)-tests indicated that participants’ positive attitudes with alcohol tended to be weaker than the negative attitudes \[t(31)=1.9, p=.06\]. With
respect to sodas, positive attitudes were significantly stronger than negative attitudes $[t(31)=11.2, p<.05]$.

### 2.2. Global attitudes

A 2 Drink×2 Valence×2 Group ANOVA showed a main effect of Valence $[F(1,30)=309.4, p<.05]$ revealing a generally positive attitude toward all drinks (see Table 2). In addition, a Drink by Valence interaction emerged $[F(1,30)=12.8, p<.05]$ which was qualified by a Drink by Valence by Group interaction $[F(1,30)=4.2, p<.05]$. Subsequent tests showed that the Drink by Valence interaction was only significant for the light drinkers $[F(1,15)=16.8, p<.05]$, but not for the heavy drinkers $[F(1,15)=1.1]$. Heavy drinkers showed a similar positive attitude toward sodas and alcoholic drinks, whereas light drinkers showed a clear preference for sodas.

### 2.3. Implicit associations

#### 2.3.1. Soda

A 2 Response (positive vs. negative)×2 Group (heavy vs. light) ANOVA pertaining to participants’ error rates, showed a significant main effect of Response, $F(1,30)=10.4, p<.05$, indicating that individuals were relatively accurate when sodas shared the response button with positive (see Table 3). None of the other effects reached significance. The pattern of RT-data was consistent with that of the errors, yet a similar ANOVA revealed no significant effects.

### Table 2

Mean (S.D.) positive and negative explicit associations and global attitudes towards alcohol and soda for light and heavy drinkers

<table>
<thead>
<tr>
<th>Explicit associations (0–100)</th>
<th>Light drinkers</th>
<th>Heavy drinkers</th>
<th>Light drinkers</th>
<th>Heavy drinkers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>40.2 (15.4)</td>
<td>72.6 (12.9)</td>
<td>45.7 (18.8)</td>
<td>70.0 (12.4)</td>
</tr>
<tr>
<td>Negative</td>
<td>59.6 (15.0)</td>
<td>23.1 (13.0)</td>
<td>51.1 (23.2)</td>
<td>22.1 (14.0)</td>
</tr>
</tbody>
</table>

### Table 3

Mean reaction times (RT) and error rates (%) for Alcohol and soda trials during the Extrinsic Affective Simon Test (EAST) as a function of response assignment

<table>
<thead>
<tr>
<th>Phase</th>
<th>Light drinkers</th>
<th>Heavy drinkers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RT</td>
<td>Error rate</td>
</tr>
<tr>
<td><strong>EAST–soda</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soda+Positive</td>
<td>740 (175)</td>
<td>8.5 (11.7)</td>
</tr>
<tr>
<td>Soda+Negative</td>
<td>740 (174)</td>
<td>11.9 (9.7)</td>
</tr>
<tr>
<td><strong>EAST–alcohol</strong></td>
<td>748 (196)</td>
<td>10.8 (8.2)</td>
</tr>
<tr>
<td>Alcohol+Positive</td>
<td>708 (144)</td>
<td>10.0 (9.5)</td>
</tr>
</tbody>
</table>

2.3.2. Alcohol

Response×2 Group ANOVAs pertaining to participants’ error rates and RTs, revealed no main effects of Response \([F(1,30)<1]\), indicative of a neutral or ambivalent implicit attitude towards alcoholic drinks (see Table 3). The pattern of error rates as well as RTs were similar for both groups \([F(1,30)<1]\).

To test whether positive implicit attitudes have independent predictive validity over and above the explicit measures, we carried out a regression analysis with alcohol problems (RAPI) as the dependent variable, and EAST-alcohol (RT-index\(^4,5\), the explicit equivalent of the EAST, and the global attitude measure as the independent variables. The EAST-index was the only variable with independent predictive properties \(\beta=.41; p=.02\), indicating that relatively positive implicit associations with alcohol are associated with more negative consequences of alcohol use. A similar analysis with mean alcohol use as the dependent variable indicated that the global attitude measure best predicted mean retrospective alcohol use \(\beta=.41, p=.01\), whereas the EAST-index showed additional predictive power \(\beta=.30, p=.06\), although the effect did not reach the conventional level of significance. Pearson’s p–m correlations are shown in Table 4.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. EAST-index</td>
<td>–</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Explicit Affect</td>
<td>.27</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Global Attitude (alcohol)</td>
<td>.19</td>
<td>.54 **</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Alcohol Problems</td>
<td>.38 *</td>
<td>.08</td>
<td>.33</td>
<td></td>
</tr>
<tr>
<td>5. Alcohol Use (mean)</td>
<td>.37 *</td>
<td>.17</td>
<td>.47 **</td>
<td>.78 **</td>
</tr>
</tbody>
</table>

The EAST-index was calculated by subtracting the performance on alcohol trials when alcohol shared the response key with negative, from the performance on trials when alcohol shared the response key with positive. Hence high scores indicate relatively positive alcohol associations. Explicit Affect was calculated as the mean association scores for alcohol exemplars and positive minus the mean scores of alcohol exemplars and negative. Global Attitude was calculated as the mean of the negative attributes minus the mean of the positive attributes. Alcohol Problems represent the score on the Rutgers Alcohol Problem Index. Alcohol Use (mean) reflects the average weekly alcohol consumption.

\* \(p<.05\).

\** \(p<.01\).

3. Discussion

The present findings support the idea that the previously reported negative IAT effects may at least partly reflect positive associations with soda rather than negative associations with alcohol. Both heavy and light drinkers displayed unambiguously positive implicit associations with sodas, whereas with

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\(\text{4 The EAST-effect was calculated by subtracting the performance on alcohol trials when alcohol shared the response key with negative, from the performance on trials when alcohol shared the response key with positive. Hence high scores indicate relatively positive alcohol associations.}\)

\(\text{5 To index the reliability of inter-individual variance we computed for both the alcohol–EAST effect and the soda–EAST effect Cronbach’s alphas based on split-half EAST scores. For alcohol } \alpha=.48, \text{ and for soda RT } \alpha=.48.\)
respect to alcoholic drinks the positive and negative automatic affective associations were of similar strength. This is consistent with the idea that people have an ambivalent rather than a negative implicit attitude towards alcohol (cf. De Houwer et al., 2004). Such an interpretation is also in agreement with the results of the explicit measures showing clear positive and clear negative attitudes with alcohol. In support of the idea that relatively positive automatic associations are involved in alcohol (mis)use, the EAST showed a positive relation with alcohol-related problems and mean alcohol use. In addition, the EAST was found to have predictive validity over and above explicit measures with respect to individuals’ mean alcohol use and was the single best predictor of individuals’ alcohol problems. Although these findings are also consistent with the idea that positive associations are a consequence rather than a cause of alcohol (ab)use, it seems not particularly convincing to argue that the negative consequences of alcohol use might have resulted in positive implicit alcohol associations.

Some limitations should be acknowledged. First, the EAST contained bipolar attribute categories. Therefore, the present study cannot differentiate between the possibility that alcohol use is related to relatively weak negative and/or to relatively strong positive automatic alcohol associations. Second, although the pattern of EAST-results was in line with the idea that heavy drinkers are characterized by relatively positive automatic alcohol associations, the difference between light and heavy drinkers did not reach significance. One explanation might be that since our heavy drinkers consisted of undergraduates rather than treatment seeking people, the level of alcohol problems may not have been sufficiently extreme and homogeneous to reliably differentiate between groups in a factorial analysis. Consistent with this, the correlational analyses did reach significance (see also Wiers et al., 2002). To conclude, the present pattern of results strongly suggests that the negative implicit alcohol associations that were found in previous studies were due to the specific characteristics of the alcohol–soda IAT. The finding that the EAST predicted unique variance concerning the indices of alcohol misuse not only sustains the alleged importance of relatively positive evaluative alcohol associations in drinking behavior, but also underlines the importance of implicit assessments of alcohol-related cognitions.

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**References**


