Short Communication

Emotional reactions to alcohol-related words: Differences between low- and high-risk drinkers

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HIGHLIGHTS

- Alcohol-related words are more appetitive for high-risk drinkers.
- High-risk drinkers perceive alcohol-related words as highly arousing.
- For alcohol-related words, high AUDIT scores are related to less dominance.

ARTICLE INFO

ABSTRACT

Introduction: Research that has examined responses to alcohol-related words in drinkers has mostly linked such responses to memory, attentional, and perceptual bias. However, studies of emotional processing in alcoholics have not received much attention. The main goal of the present study was to identify the features and differences of emotional responses to alcohol-related words in low- and high-risk drinkers.
Method: A total of 149 low-risk drinkers and 125 high-risk drinkers evaluated five alcohol-related words and 15 words from the Affective Norms for English Words in the dimensions of valence, arousal, and dominance using the Self-Assessment Manikin.
Results: The results indicated that high-risk drinkers evaluated alcohol-related words as more appetitive and arousing.
Conclusion: These results, together with findings in the attention and memory research literature, suggest that alcohol-related words can serve as conditioned cues in alcohol consumption.

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1. Introduction

Previous research has demonstrated the ability of words to prompt emotional reactions in humans (Bradley & Lang, 1999). These studies indicate that words that have appetitive and aversive content generate high arousal, and words that have neutral valence prompt low arousal. This pattern has been described across different countries (Kristensen, Gomes, Justo, & Vieira, 2011; Redondo, Fraga, Padrón, & Comesaña, 2007; Soares, Comesaña, Pinheiro, Simões, & Frade, 2012).

Previous studies have also demonstrated that words facilitate the recognition of emotions in facial expressions (Gendron, Lindquist, Barsalou, & Barrett, 2012), modulate the activation of facial muscles that are sensitive to stimulus valence (Herbert, Deutsch, Sütterlin, Kübler, & Pauli, 2011), and allow the study of neurological processes that are associated with emotions (Herbert, Kissler, Junghöfer, Peyk, & Rockstroh, 2006). Words can also reliably capture an individual's attention, especially those that depict sexual and aversive content (Aquino & Arnell, 2007; Arnell, Killman, & Fijavz, 2007), but the effect diminishes rapidly with aversive words (Harris & Pashler, 2004).

Research that has used words with alcoholic patients has focused on assessing attention, memory bias (Fridrici et al., 2014; Johnsen, Laberg, Cox, Vaksdal, & Hugdahl, 1994) and emotional reactions (Stormark, Laberg, Nordby, & Hugdahl, 2000). Nevertheless, studies on emotional responses to alcohol-related words have been inconclusive. For example, Stormark et al. (2000) reported that alcohol-dependent subjects exhibited a significantly greater skin conductance response and greater heart rate deceleration in response to alcohol-related words compared with neutral and aversive words; however, no differences were found between alcoholic and nonalcoholic participants. Additionally, this study did not use appetitive words, which may be pivotal when considering that social interaction and advertising associated with alcohol consumption are related to appetitive cues, which is reflected in verbal and written language (van Zyl & Meiselman, 2015). Furthermore, studies on emotional responses to alcohol-related words have only been performed with alcoholic patients. Differences between low- and

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high-risk drinkers have not been examined. Such drinkers represent the typology of the largest proportion of drinkers in the population.

To address this issue, the present study sought to identify the features and differences of emotional responses to alcohol-related words in low- and high-risk drinkers and make comparisons with emotional responses to affective and neutral words.

2. Methods

2.1. Participants

A total of 274 university students (139 females) voluntarily participated in the study. The participants were distributed into two groups according to scores on the AUDIT (WHO, 2001): low-risk drinkers ($n = 149$; scores between 1 and 7; $M = 3.89$, $SD = 1.85$) and high-risk drinkers ($n = 125$; scores between 8 and 19; $M = 11.56$, $SD = 3.54$; $t(272) = -22.92$, $p < .0001$). No significant differences were found between groups in age, percent of men and women, and years of drinking (all $p > .49$). A 3-year history of alcohol consumption was used as the inclusion criterion. The study was approved by the University of San Buenaventura Review Board and all of the subjects signed written informed consent forms.

2.2. Stimuli

Fifteen words (five pleasant, five neutral, five unpleasant) were selected from the Affective Norms for English Words (ANEW) (Bradley & Lang, 1999), which were translated to Spanish by Redondo et al. (2007). Five alcohol-related words[1] were also included. For the selected ANEW words significant differences were found between word categories in the valence dimension (all $p < .0001$). For the arousal dimension, significant differences were found between affective words (pleasant and unpleasant) and neutral words (both $p = .001$).

2.3. Measures

The Self-Assessment Manikin (SAM; Bradley & Lang, 1994) is a nonverbal pictographic scale designed to assess a participant's feelings in three emotional dimensions: valence (pleasant vs. unpleasant), arousal (relaxed vs. activated), and dominance (feeling in control vs. feeling controlled). Each dimension is represented by humanoid figures that indicate different levels of intensity.

2.4. Procedure

In small groups of not more than 28 individuals, the participants were provided with booklets that contained the SAM scales to evaluate the words. The Spanish instructions were presented in a digital audio format. After instructions were given to the participants, three words were used as examples, one word from each of the affective categories (Friend, Cabinet, and Killer). The instructions and words were presented using a projector. The words were presented in white against a black background in the center of the screen in 80-pt Arial font. Each trial consisted of three parts: 6 s of word presentation, 15 s to rate the word using the SAM scale, and a 5 s intertrial interval. After the words were presented, the participants completed the AUDIT. Four different pseudo-randomized word presentation orders were prepared. Each order had the constraint of not presenting the same word category consecutively more than twice.

[1] Pleasant words: Kiss, Caress, Chocolate, Orgasm, and Treasure. Neutral words: Street, Basket, Square, Table, and Paper. Unpleasant words: Infection, Abuse, Dirty, Torture, and Rape. Alcohol-related words: Beer, Bar, Party, Drunk, and Drink.

2.5. Statistical analysis

Pearson's linear correlation was used to analyze correlations between valence and arousal, and valence and dominance. To examine the emotional processing of alcohol-related words and ANEW words in the two alcohol consumption groups, we ran separate mixed ANOVAs 2×4 for each emotional dimensions, with type of alcohol consumption as the between-subjects factor (low- and high-risk drinkers) and word category (pleasant, neutral, unpleasant, and alcohol-related) as the within-subjects factor. Post hoc analyses of the mean values were performed using paired multiple comparisons, adjusted with the Bonferroni correction. Finally, a Pearson correlation was used to analyze the association between AUDIT scores and SAM ratings for alcohol-related words. The level of significance was set at $p < .05$. All of the statistical analyses were performed using SPSS 20.0 software.

3. Results

3.1. Affective space

Fig. 1A and B illustrates the distribution of the 20 words in the two-dimensional affective space that was composed of the valence and arousal dimensions. In both groups, pleasant words were very appetitive and highly arousing. Neutral words had an intermediate valence and were slightly arousing. Unpleasant words were aversive but not highly arousing. Alcohol-related words had a different distribution for low- and high-risk drinkers. Low-risk drinkers evaluated them with an intermediate valence and arousal (Fig. 1A). By contrast, they were very appetitive and highly arousing for high-risk drinkers (Fig. 1B).

The quadratic correlation was positive and significant for low-risk drinkers ($R^2 = .96$, $p < .0001$) and high-risk drinkers ($R^2 = .94$, $p < .0001$), suggesting the influence of valence on arousal. For low-risk drinkers, Pearson's correlation between appetitive valence and arousal was positive and significant ($r = .97$, $p < .0001$, $R^2 = .94$) and negative and significant for aversive valence and arousal ($r = -.93$, $p < .0001$, $R^2 = .86$). Pearson's correlation was also positive and significant between appetitive valence and arousal for high-risk drinkers ($r = .94$, $p < .0001$, $R^2 = .88$), but it was negative and not significant between aversive valence and arousal ($r = -.14$, $p = .66$, $R^2 = .01$).

Fig. 1C and D shows the distribution of the 20 words in the two-dimensional affective space that was composed of the dominance and valence dimensions. The words were generally distributed similarly in both groups, but alcohol-related words were placed in a similar region as neutral words for low-risk drinkers (Fig. 1C). In contrast, in high-risk drinkers, words that depicted alcohol content were placed in a region that was closer to pleasant words (Fig. 1D). A positive and significant linear relationship was found in both groups (low-risk drinkers: $r = .88$, $p < .0001$, $R^2 = .77$; high-risk drinkers: $r = .86$, $p < .0001$, $R^2 = .73$).

3.2. Emotional dimensions

3.2.1. Valence

The ANOVA revealed a significant main effect of word category ($F_{3,516} = 732.59$, $p < .0001$, $\eta^2 = .79$). Pleasant words were the most appetitive and unpleasant words were the most aversive (all $p < .0001$). Alcohol-related words were perceived as more appetitive than unpleasant and neutral words but less appetitive than pleasant words (all $p < .0001$). A significant quadratic trend was obtained ($F_{1,172} = 1140.26$, $p < .0001$, $\eta^2 = .86$). A significant Word × Alcohol consumption interaction was found ($F_{3,516} = 14.96$, $p < .0001$, $\eta^2 = .01$). High-risk drinkers perceived alcohol-related words as more appetitive than low-risk drinkers ($p < .001$), and low-risk drinkers evaluated neutral words with more valence than high-risk drinkers ($p < .001$) (Fig. 2A).