ALCOHOL CONSUMPTION IN YOUNG ADULTS: THE ROLE OF MULTISENSORY IMAGERY

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Abstract

Little is known about the subjective experience of alcohol desire and craving in young people. Descriptions of alcohol urges continue to be extensively used in the everyday lexicon of young, non-dependent drinkers. Elaborated Intrusion (EI) Theory contends that imagery is central to craving and desires, and predicts that alcohol-related imagery will be associated with greater frequency and amount of drinking. This study involved 1,535 age stratified 18-25 year olds who completed an alcohol–related survey that included the Imagery scale of the Alcohol Craving Experience (ACE) questionnaire. Imagery items predicted 12-16% of the variance in concurrent alcohol consumption. Higher total Imagery subscale scores were linearly associated with greater drinking frequency and lower self-efficacy for moderate drinking. Interference with alcohol imagery may have promise as a preventive or early intervention target in young people.

1. Introduction

The association between consummatory behavior and craving is well documented (Fortuna, 2012). As there is considerable evidence that craving plays a central role in substance use disorders (SUD) (Leggio, 2009; Tiffany & Wray, 2012), the recently released DSM-5 now includes *craving or a strong desire or urge to use a substance* as a diagnostic SUD criterion (American Psychiatric Association, 2013). There is little research on the role of craving in non-clinical, substance using populations. This is in spite of common reporting of urges and desires for drinking used in the everyday lexicon of non-dependent drinkers. There is some empirical evidence that craving is experienced by young, recreational drinkers (Connor, Feeney, Jack, & Young 2010; Love, James, & Willner, 1998; McEvoy, Stritzke, French, Lang, & Ketterman, 2004). For example, in a sample of college students ($n = 309$), Connor, et al. (2010) found that a widely used measure of alcohol craving, the Obsessive Compulsive Drinking Scale (OCDS, Anton, Moak, & Latham, 1995), predicted approximately half of the variance in Alcohol Use Disorder Identification Test scores (AUDIT, Saunders, Aasland, Babor, De La Fuente, & Grant, 1993) and a quarter of the variance in average consumption per drinking occasion.

Definitional and measurement problems have hindered progressing a more comprehensive understanding of craving in both clinical and non-clinical studies. Often measures confound craving with behaviors, or cognitive phenomena such as expectancies, intentions, or perceived behavioral control (Kavanagh, et al., 2013). This has likely inflated estimates of predictive power in previous research and restricted our capacity to disentangle key psychological mechanisms of craving. Broadly, craving can be defined as an affectively-charged cognitive event in which an object or activity is associated with pleasure or relief of

discomfort (Kavanagh, Andrade, & May, 2005). Reliable and valid measures of alcohol craving and desire are now available to capture key components of alcohol craving (e.g., frequency, intensity, salience) (Statham, et al., 2011; Kavanagh, et al., 2013).

A component of craving which has drawn increasing attention is the role *imagery* (Kavanagh, et al. 2009). Little is known about the role that imagery plays in non-dependent drinking. Elaborated Intrusion (EI) Theory (Kavanagh, et al., 2005) places sensory imagery at the heart of craving. Vivid sensory imagery is seen as central to desires, eliciting anticipatory consummatory pleasure. Laboratory research in non-clinical samples confirms that imagery is multisensory and accompanies consummatory desires, with more vivid imagery associated with stronger desires (May Andarade, Panabokke, & Kavanagh, 2004; May, Andrade, Kavanagh & Penfound, 2008). Competing visual or olfactory imagery are more effective in reducing craving for cigarettes (May, Andrade, Pannabokke, & Kavanagh, 2010; Versland & Rosenberg, 2007), food (Kemps & Tiggemann, 2007; Kemps & Tiggemann, 2013) and coffee (Kemps & Tiggemann, 2009), than are auditory imagery or verbal tasks.

The Alcohol Craving Experience (ACE) questionnaire (Statham, et al., 2011), based on EI Theory (Kavanagh, et al., 2005), includes an Imagery scale that measures key sensory components of craving; imagining taste, smell and sensations of drinking. Identifying additional targets of hazardous drinking may result in novel prevention and early intervention approaches for young, 'at risk' drinkers. Recent evidence suggests imagery-based techniques can strengthen behavior change plans and increase the chance of success (Hackman, Bennett-Levy, & Holmes, 2011; Knäuper, et al., 2011). An initial step is to assess the relationship between imagery and drinking in a large community sample. Based on laboratory evidence,

we expect more vivid imagery will be associated with higher levels of alcohol consumption and harmful use.

2. Method

2.1 Participants

A community sample of 1,535 age stratified 18-25 year olds were surveyed online using a market research company. The average age of participants was 22.7 years (SD 2.39), and 54% were female (816/1522). Ethics approval was obtained from the Queensland University of Technology Human Ethics Research Committee.

2.2 Measures

2.2.1 Alcohol Craving Experience (ACE, Statham, et al., 2011).

Based on the EI theory of desire (Kavanagh, et al. 2009), the Imagery scale of the ACE (ACE-Imagery, Statham, et al., 2011) measures five sensory aspects of craving (imagining taste, smell, sensations in the mouth, sensations in the body, picturing drinking) and is significantly associated with problem drinking and other features of craving (Statham, et al., 2011). In this study the ACE is scored on a five-point scale from 1 (Not at All) to 5 (Constantly). The ACE- Imagery has excellent internal reliability (.94) and construct validity (Statham, et al., 2011). Internal reliability in the current sample was .95.

2.2.2 Alcohol Consumption

Indices of alcohol consumption were assessed to capture range and intensity of drinking over the previous 12 months. Quantity of drinking per day was measured by asking "When you are drinking, how many drinks containing alcohol do you typically consume?" Respondents were shown standard drinks pictures and nominated how many drinks they consumed between

Monday and Sunday. <u>Average quantity of drinks per day</u> was then calculated (quantity/frequency). <u>Binge drinking frequency</u> was measured by "How often do you have more than 4 drinks on one occasion (in the last month)". <u>Maximum drinking per drinking occasion</u> was calculated by: "In the last month, what is the maximum number of drinks (on one occasion) you had consumed". <u>Frequency of drinking</u> was measured by AUDIT Item 1 (Saunders et al., 1993) "How often do you have a drink containing alcohol"? (responses ranged from never to 4 or more times per week).

2.2.3 <u>Self-Efficacy for Moderate Drinking</u>

Self-Efficacy was measured by adapting Perugini and Bagozzi (2001) and Bagozzi and Dholakia (2002) scales to the goal of moderate drinking "Thinking about the next 4 weeks, how confident are you that you can maintain moderate drinking behavior (4 or less drinks for women; 6 or less drinks for men) if you are [in a particular drinking situation]?" Drinking situations included: at a party with friends, not relaxed in social situations, in a 'shout' (when drink offered), when wanting to feel more confident, and when offered free drinks. The total score had an internal reliability coefficient of .93.

2.3 Procedure

Based on age stratification, community members who have previously participated in research panels were sent an invitation to be involved in this study. Following consent, questionnaires were administered online to panel members as a battery that additionally asked about smart phone usage and peer group communication. Questionnaires were de-identified before being returned to researchers. Participants were reimbursed for their participation.

3. Results

3.1 Alcohol Consumption

On average, participants consumed 1.06 standard drinks (10g alcohol) daily (SD = 1.59, range 0-15.57), exceeded 4+ drinks (in one session) per month an average of 1.97 times (SD = 3.09, range 0-30) and had an average of 5.01 maximum number of drinks per drinking occasion (SD = 5.84, range 0-30).

3.2 Imagery and Consumption

Linear multiple regressions examined the association between ACE Imagery scores and average alcohol consumption per day, 4+ drinks in one session per month, and maximum number of drinks per drinking occasion (Table 1). Imagery items predicted 14.4% of the variance in average alcohol consumption per day (F [5, 1482] = 49.57, $p < .001$), with *picture* and *body would feel* items the significant predictors. Sixteen percent of the variance in *4+ drinks in one session per month* (F [5, 1481] = 56.27, $p < .001$) was predominantly accounted for by three items (picture, taste, body would feel). Imagery items accounted for 12% of the variance in maximum number of drinks per drinking occasion (F [5, 1485] = 40.49, $p < .001$), with *picture* and *smell* and *body would feel* items the significant predictors. All ACE Imagery items had significant zero-order correlations with each of the three drinking indices (Table 1, range .17 to .38, mean .29). The Imagery total score was negatively correlated with the Self-Efficacy for Moderate Drinking Scale ($r = -.34$, $p < .001$). Almost identical results were obtained when analyses were run separately for men and women.

----Insert Table 1 here----

ANOVA examined ACE Imagery total scores by frequency of drinking (AUDIT, Saunders, et al., 1993). There was a significant difference between frequency groups, $F_{(4, 1514)} = 58.87$, $p < .001$), with all post hoc tests significant at $p < .01$, indicating a clear linear relationship between intensity Imagery scores and frequency of drinking (Figure 1).

----Insert Figure 1 here----

4. Discussion

This is the first large, age stratified community sample investigating components of alcohol craving. Drinking behavior, as measured by average daily alcohol intake, number of occasions drinking more than 4 drinks per session and maximum intake in a drinking session, were associated with all sensory image modalities. This further supports EI Theory's assertion that craving involves multisensory imagery (Kavanagh, et al., 2005). Craving imagery explained between 12% and 16% of the unique variance in drinking behavior across all measures. More frequent imagery was associated with more frequent drinking.

Visual imagery of alcohol or drinking was a consistent predictor of drinking behavior in this community sample. This additionally supports findings that visual imagery is important in craving for many substances, including food and drink (May et al, 2004; 2008; in submission) and cigarettes (May et al, in submission). It has also been observed in treatment-seeking alcohol use disorder patients (Kavanagh, 2009; Statham 2011). Imagery of how one's body would feel when drinking, was also a consistent predictor across all indices of drinking behavior. Taste imagery predicted frequency of 4+ drinks in one session and smell imagery predicted maximum number of drinks. Kavanagh et al (2009) reported that imagery of swallowing alcohol correlated with craving duration. The present study found that a similar

item, imagery of how alcohol would feel in the mouth or throat, correlated with drinking behavior but did not uniquely predict it. This is possibly because that item was subsumed by the more general 'body feel' item.

This study has limitations. While the sample size was large and craving measurement robust, the cross-sectional design does not allow an assessment of causality or temporal precedence. Findings may not be generalizable to all recreational community drinkers, as we restricted our recruitment to younger drinkers (18-25 years of age). No standardized screening or diagnostic instruments were used to allow exclusion of dependent drinkers, although the range and distribution of consumption indicates that if they were present, prevalence would be low. Biological verification of alcohol use over a longer period would have strengthened confidence in self-reported consumption data.

This study confirms the role of multisensory imagery in alcohol craving and extends previous research by showing that this imagery is associated with drinking behavior in a community sample. Consistent with EI Theory, imagery appears to be a strong motivator of behavior. Interventions targeting alcohol craving could include tasks that block visual and 'body feel' imagery, for example, encouraging patients to imagine how good they would feel doing something other than drinking, such as playing football tomorrow without a hangover.

To pursue this further a new imagery-based intervention (Functional Imagery Training, FIT) is in the pilot phase. The intention is to strengthen and maintain motivation to control alcohol use by developing imagery about the benefits of reduced consumption, control strategies, and past successes. Practice in the natural environment is supported by a mobile phone application, which cues imagery at high-risk occasions, using photos that participants take or

select from a library. This functional imagery has the additional effect of competing with imagery about alcohol. Interventions such as these may provide useful strategies for prevention in young people at risk of negative impacts from alcohol misuse.

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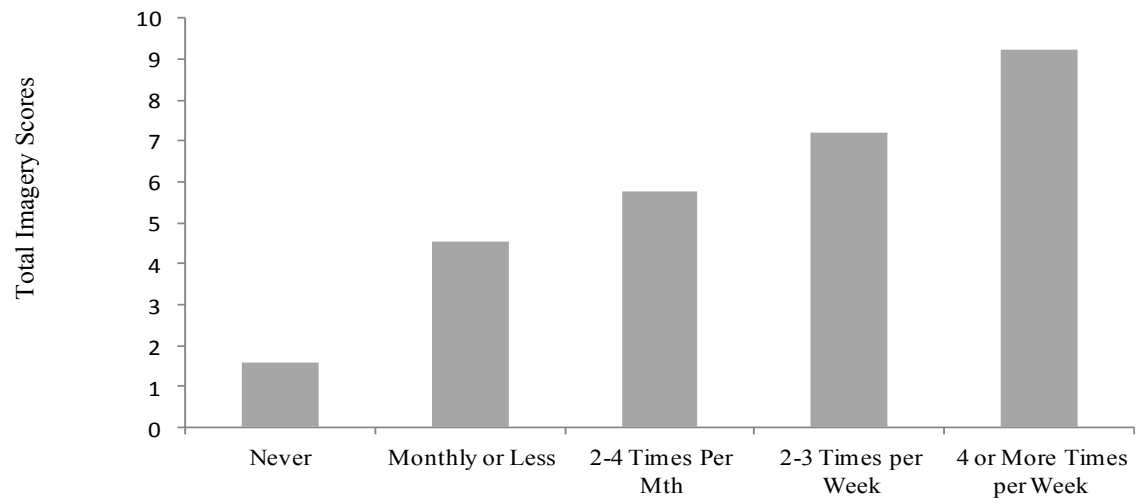
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Table 1. ACE Imagery by Alcohol Consumption Indices

	Mean	SD	Average Alcohol Per Day			4+ Drinks per Month			Max Number of Drinks		
			R^2	β	r	R^2	β	r	R^2	β	R
Predictor (ACE- Imagery)			.143			.160			.120		
How often do you *picture* alcohol or drinking?	1.71	1.00		.156***	.34***		.228***	.38***		.313***	.32***
How often do you imagine what it would *taste* like?	1.72	1.02		.086	.31***		.164**	.34***		.072	.22***
How often did you imagine what it would *smell* like?	1.61	1.00		.005	.29***		-.024	.31***		-.173**	.17***
How often did you imagine what it would *feel like in your mouth or throat*?	1.62	1.02		-.096	.28***		-.092	.29***		-.097ᵃ	.17***
How often did you imagine how your *body would feel* if you had a drink?	1.75	1.05		.249***	.35***		.147***	.34***		.199***	.27***

ᵃp < .10   *p < .05   ** p < .01 *** p < .001

Figure 1. Total Imagery Scores by Frequency of Drinking.