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Development and first validation of the Refined Alcohol Expectancy Task (RAET)

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Opinions and recommendations expressed in this report are those of the authors.

Contents

Index of tables

Index of figures

Executive summary

Background

Addressing limitations of existing self-report measures of alcohol-related thoughts and behaviours, researchers have begun to measure these pictographically. To date, however, these novel measures have been developed somewhat unsystematically and are predicated on a number of potentially problematic assumptions, meaning that researchers have not been able to assess their reliability or validity fully. This report therefore documents the development of a Refined Alcohol Expectancy Task through (1) selection (2) development and (3) testing of stimuli for inclusion of this pictograph-based tasks. It also provides initial validation data.

Methods

Method: Phase 1 - A hierarchy of most commonly consumed alcoholic beverages was established, along with a consensus regarding beverage presentation format. Phase 2 - A professional artist was hired for an iterative development process, producing emotion pictographs that were designed to display characters in everyday scenarios, exhibiting different emotions (e.g., Angry Man watching the TV) based on the Circumplex Model of Affect. Specialised photography of the selected beverages was carried out. Phase 3 - Participants' ability to identify accurately beverage and emotion stimuli was assessed asking participants to use a response box to indicate which word (from a choice of eight) matched the image that was presented on the screen. Phase 4 - Inverse Efficiency scores for individual stimuli were calculated based on accuracy and reaction time. The psychometric properties of the task were then assessed using confirmatory factor analysis and the extent to which scoring high on positive expectancies and low on negative expectancies was associated with self-reported alcohol use was assessed.

Findings

Wine, beer and vodka were the most popularly consumed alcoholic beverages, with a preference for photographic representations. Participants demonstrated equal efficiency in recognising the developed alcoholic and non-alcoholic pictures, as well as the capacity to accurately identify the emotional pictographs that were designed to represent the emotions from Circumplex Model of Affect. Validation by means of confirmatory factor analysis indicates adequate psychometric properties and the RAET successfully assesses alcohol expectancies, expressed in terms of emotions individuals think will occur when people drink alcohol. Contrary to expectations, expectancy dimensions assessed by the RAET seemed to be independent of drinking habits.

Conclusions

Maximising the transparency of the stimuli selection, development and assessment process, these results provide a solid basis for a more systematic redevelopment of the scenario-based assessment of alcohol expectancies. Initial validation suggests that the task also appears useful at assessing emotionally shaped alcohol expectancies. Future research is required to examine reasons why, contrary to questionnaire-based measures, RAET-assessed expectancies were not associated with alcohol consumption.

Introduction

Self-report questionnaires are generally considered to be a reliable and valid method of assessing substance use related behaviours and cognitions (Boca & Noll, 2000; Giovannucci et al., 1991; Greenfield & Kerr, 2008). Despite their widespread implementation and advantages of self-report measures (Brace, 2018) several concerns concerning their use have also been noted.

First, while previously treated as relatively static, there is a growing body of research which points to apparent variations in alcohol-related beliefs. This body of work indicates that social and environmental factors are important influences on a variety of alcohol-related cognitions, drinking practices and consumption (Arterberry, Smith, Martens, Cadigan, & Murphy, 2014; Lau-Barraco & Dunn, 2009; Monk, Rebecca L. & Heim, 2013b; Thrul, Labhart, & Kuntsche, 2017). Second, self- report questionnaires are ultimately dependent on respondents' ability to reliably and accurately self-reflect on their thoughts and behaviour. These reports may therefore be influenced by perceived demands of the researchers (Davies & Best, 1996; Schwarz, 1999), by the social and environmental contexts in which surveys are administered (Monk & Heim, 2013; Monk, Rebecca L. & Heim, 2013a; Monk, Rebecca L. & Heim, 2014; Monk, Rebecca Louise & Heim, 2013) or memory-related impairments caused by alcohol consumption itself (Walker & Hunter, 1978; Weissenborn & Duka, 2003). Third, self-report assessments of alcohol-related cognitions can be time-consuming, and the language used can be prohibitive to those with lower or as-yet undeveloped literacy skills (Kuntsche & Kuntsche, 2017). Finally, these assessments typically provide participants with a predefined association (e.g., "drinking = happiness") which participants are invited to (dis)agree with (Gmel, Kuntsche, Wicki, & Labhart, 2010; Kuntsche & Kuntsche, 2017; Monk, Rebecca L., Pennington, Campbell, Price, & Heim, 2016) . This means that it is possible that, to a greater or lesser extent, participants' responses are an artefact of the questioning process rather than a reflection of beliefs or states.

To overcome such concerns researchers have begun to utilise pictographic assessments of alcohol-related beliefs and cognitions (Monk et al., 2016; Nees, Diener, Smolka, & Flor, 2012; Pronk, van Deursen, Beraha, Larsen, & Wiers, 2015). Lopez-Caneda and Carbia (López-Caneda & Carbia, 2018) created a resource for researchers by collating and standardising a range of licenced images of alcoholic and non-alcoholic drinks in real-life scenarios, and Fey and colleagues' (Fey et al., 2017) developed a database of alcoholic beverages and neutral objects (e.g., a wheelbarrow). However, while the former only included positive and neutral images, the latter approach excluded non-alcoholic drinks.

In response to such limitations, the Alcohol Expectancy Task[AET] (Kuntsche & Kuntsche, 2017) was designed to assess expectancies about the effects of alcohol in a more 'neutral' way by using different contexts and beverages without presenting respondents with predefined associations between outcomes and alcohol. Specifically, building on the electronic Appropriate Beverage Task [eABT]; (Kuntsche, Le Mével, & Zucker, 2016), the AET depicts several pictographic representations of everyday scenes in which characters display a variety of emotions, representing each of the emotions outlined in the Circumplex Model of Affect (Russell, 1980); (CMA; e.g., excited [positive arousal], annoyed [negative arousal], relaxed [positive sedation], sad [negative sedation]). For each scene, the participants' task is to select the beverage they believe the characters have consumed, selecting from an array of concurrently presented alcoholic and non-alcoholic drinks. This removes any pre-defined association between

alcohol consumption and certain outcomes/beliefs. It also has the advantage that assessments can be carried out without a reliance on written language.

Nevertheless, while such pictographic approaches constitute a significant step forward in the assessment of alcohol-related beliefs, the existing AET does not balance fully the emotions displayed (e.g., sad, joyful etc.) with different kinds of activities shown in the scenarios (e.g., watching TV, playing outdoors etc) (Kuntsche & Kuntsche, 2017). Furthermore, while the emotions and beverages used in the AET exhibit apparent face validity, there was no systematic assessment of this during task development.

To share practice, promote cross-fertilisation between developers and researchers, and encourage confidence in their use, this report outlines a) the development and b) initial validation of a pictorial measure of alcohol-related beliefs, namely the refined Alcohol Expectancy Task (RAET).

Method

Phase 1-Stimuli Selection

In this phase, we describe how we selected which stimuli we would focus upon. This involved: ***(a) Producing a hierarchy of most common alcoholic beverages.*** This was important to ensure that the RAET contained recognisable beverages across different geographic settings as there is preference variability even amongst (predominantly western) drinking cultures, in which alcohol consumption is omnipresent (Gordon, Heim, & MacAskill, 2012; Room & Mäkelä, 2000). ***(b) Establishing a consensus regarding beverage presentation format.*** To aid recognisability of the beverages and engagement with the task, participants were also asked how they would prefer presentation of the alcoholic beverages (i.e., in a drawn picture/pictogram or in photographic form).

Participants

A convenience sample of 168 UK and Australian university students and staff (Female 82%, *M*age 24.15, *SD* = 8.16) were recruited for this phase of the research. UK respondents (n=117) included 13 males and 104 females with a mean age of 21.84 (*SD* = 5.03). Australian respondents (n=51) included 34 females and 17 males with a mean age of 29.47 (SD = 11.07) years.

Materials and procedure

Participants were approached during lectures and in response to advertisements on UK and Australian University campuses, respectively. Interested participants were provided with a blank form and asked to list what they thought were the four most commonly consumed alcoholic beverage types (avoiding brand names). They were also asked 'if you had to instantly recognise an alcoholic beverage (i.e., within a fraction of a second), would you prefer a drawn picture/pictogram or a photograph?'

Phase 2 – Stimuli Development

This phase involved ***(a) development of the emotion pictographs.*** An artist was hired to produce black-and-white drawings displaying the CMA emotions (Russell, 1980). An iterative process of development and alterations was undertaken by the artist, with feedback from the research team so as to optimise the stimuli prior to validation testing. ***(b) Professional production of the beverage photographs.*** In order to standardise lighting and appearance, professional photography sessions were undertaken to capture the alcoholic beverages. This was done with the intention of maximising participant engagement and to ameliorate any concerns about variability in attention.

Materials and Procedure

We reached out to several professional artists based in Australia regarding the systematic development of a set of black and white illustrations of individuals engaged in various culturally ubiquitous activities and displaying a range of emotions. Based on previous versions of the task and the aims of the project, researchers discussed and developed a set of 23 illustrations (see example in Figure 1). These displayed seven neutral settings (e.g., family camping) and four everyday scenarios (e.g., a woman watching TV). Each of these settings was replicated four times to represent each of the

emotional states from the CMA (arousal-positive, sedation-positive, sedation-negative, arousal-negative). This culminated in drawings which displayed characters, in everyday scenarios, exhibiting different emotions (e.g., Angry Man watching the TV, Depressed Man watching the TV, Cheerful Man TV and Relaxed Man TV). Researchers then engaged in a collaborative process with the artist involving several iterations of the prospective illustrations, designed to ensure clarity of the emotions. Illustrations were discussed between all researchers until a final set were agreed upon (see Appendix 1).

Figure 1 Examples of Emotional Scenarios

A professional photographer was engaged to take photos of the beverages to be used in the task. Beverages were photographed in a similar format to previous versions of the task. Specifically, the images displayed beverages in their most common container (e.g., a bottle or tea pot) and accompanied with an appropriate drinking vessel (e.g., a glass or cup). The beverages were displayed against a plain white background and the positioning and orientation of all containers and vessels were displayed consistently (e.g., container on the left, vessel on the right). The beverage labels were obscured to avoid identifying brands. See Figure 2 for colour examples (the full set – in grey scale – can be seen in Appendix 2).

Figure 2 Example of Beverage Photographs (left: Champagne, right: Water)

Phase 3 – Stimuli testing

Participant responses to each beverage photo and the emotions displayed in drawings were assessed using response times and accuracy. This was done to ensure that the beverage and emotions depicted were cross-nationally recognisable and accurate representations. Inverse efficiency scores (a measure combining speed and accuracy, specifically ‘response time / 1 – error rate’) were also calculated in order to evidence how efficiently participants processed the stimuli.

Participants

Fifty-three participants aged 18-61 years in the North West of England were recruited through opportunity sampling[1]. Three cases were excluded due to missing gender values or outlying age. The remaining net sample used for analysis consisted of 50 participants (52% female) aged 18-53 (M = 29.40, SD = 9.99), with a mean AUDIT score of 5.98 (SD = 6.15).

Materials

The 31 images (of emotion and beverages) developed in Phase 2 were utilised in this phase (see supporting information Appendix 1 and 2).

Patterns of alcohol use were measured by the AUDIT-C questionnaire (Bush, Kivlahan et al. 1998) which asked participants to self-report how often they have a drink containing alcohol, how many drinks they have on a typical day when drinking and how often they have six or more drinks on any one occassion. Participants provided answers on a likert scale, from which we developed a quantity/frequency and a binge score.

Procedure

Participants were placed in front of a laptop and a response box, while the researcher explained that the task involved required participants to indicate which word (from a choice of eight) matched the image that was presented on the screen. Each image was presented on the screen in an 800x800 pixel box and remained on-screen until the participants responded (see Figure 3). The names of eight beverage or emotions were shown under the image, with their location corresponding to the location of the buttons on the response box. Participants were asked to select which item was present (the correct answer was always present on the screen).

[1] The beverage pictures were developed by an Australian artist and although the iterative development process between researchers was designed to reduce any cultural biases, we could not entirely rule out this possibility. As such, we selected an independent UK sample in order to test the stimuli and ensure that the accuracy of the representations.

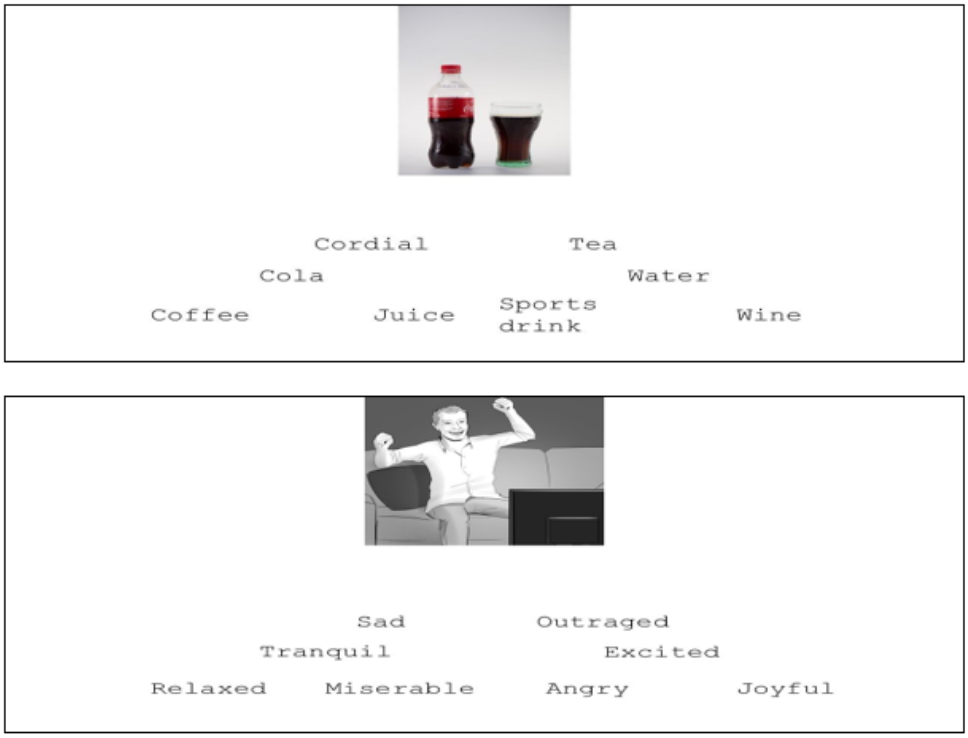

Figure 3 Example image from soft drink (top) and alcoholic (bottom) stimuli testing

Participants initially completed three practice blocks, with one block of emotional image trials (n=8), one block of alcohol beverage image trials (n=5) and one block of non-alcoholic beverage trials (n=7). These were followed by the main experiment. This also consisted of three blocks, two of consumable image trials (alcohol and non-alcoholic beverages; n=16 for each block) and one block of emotional image trials (n=32).
The presentation order of the blocks in both the practice and experimental sections were randomised, as was the order of the image trials within each block. For beverage trials, eight words (2 alcoholic and 5 non-alcoholic beverages) were written beneath each image. For emotion trials, each picture was accompanied with eight emotion adjectives, representing the four emotion categories assumed by the CMA: Joyful, Excited (arousal-positive); Relaxed, Tranquil (sedation-positive), Sad, Miserable (sedation-negative), Angry, Outraged (arousal-negative). Selection of either of the two adjectives within the target emotion category was taken as a correct response.

After this task, participants were asked to complete the AUDIT-C questionnaire (Saunders, Aasland, Babor, de la Fuente, & Grant, 1993) and provide demographic information. Finally, participants were debriefed and reimbursed (£8) for their time.

Analytic strategy

Accuracy scores were defined as one minus the proportion of errors for each image. Responses were coded as correct if the right response to the consumable item was selected. For the affective scenes, pressing one of two affective adjectives was scored as correct (for example, both ‘Angry’ and ‘Outraged’ were correct for an arousal-negative image). Response time was defined as the time between image display and button press in milliseconds. Inverse Efficiency Score (IES) was then calculated from accuracy and response times according to guidelines (Townsend & Ashby, 1983) . As noted previously, it is easy for researchers to make value judgments about the face validity of their stimuli.

However, combining speed, accuracy and efficiency scores allowed us to assess more objectively whether participants could easily and correctly identify the stimuli. We were also able to evaluate whether participant demographics and alcohol consumption habits affected this process.

SPSS Version 23 was used to explore differences in response efficiency using preliminary *t*-tests. Efficiency scores were then input into mixed-model analyses of variance (ANOVAs). Beverages had two factors (alcohol content and drink type) while emotion stimuli had three factors (type of scenario, arousal [e.g., sedation] and valence [e.g., positive]). Gender, student status and AUDIT score were also included as between participant factors in Participant age was correlated with efficiency to explore any associations.

Phase 4 - Validation

Participants, materials and procedure

As outlined in Phase 4. Descriptive and correlational statistics were used to explore the metrics and bivariate associations between participants' expectancies and drinking patterns. Spearman correlations were used to account for the non-normal distribution of some variables; strength of the relationship (*r*) and the significance level (*p value*) are reported.

Analytic strategy

To confirm the 4-factor structure of the expectancies, a confirmatory factor analysis (CFA) was performed using the Mplus statistical software (Muthén & Muthén, 2015). Weighted least square mean and variance adjusted estimation (WLSMV) were used to account for the dichotomous nature of the items. To evaluate model fit, comparative fit index (CFI) and Tucker-Lewis index (TLI) relate to the total variance accounted for by the model, where values higher than .95 are sought; root-mean-square error of approximation (RMSEA) and standardized root mean square residual (SRMR) relate to the residual variance, where values lower than .08 indicate good model fit (Hooper, Coughlan, & Mullen, 2008). Internal consistency of the four dimensions was assessed with the Kuder-Richardson coefficient (KR20) (Sijtsma, 2009). Comparisons of nested CFA models were used to ascertain whether the data fit of a 2-factor model (i.e. arousal vs. sedation, positive vs. negative) was as good as or better than that of the 4-factor model. Comparisons of model fit were conducted by means of the Mplus Difftest option for WLSMV estimation using scaling correction to approximate the chi-square distribution (Muthén and Muthén 1998-2005).

Findings

Phase 1

- Participant preferences were as follows:
    - In the UK, Vodka (n=105; 90%), Beer (n=94; 80%) and Wine (n = 68; 58%) were the most commonly listed beverages, Followed by Gin (n=66; 56%) and Cider (n=42; 36%).
    - In the Australian group, Beer (n=50; 98%) and Wine (n=48; 94%) were the most commonly listed beverages, followed by Cider (n=31; 61%) and Vodka (n=31; 61%).

- UK respondents preferred a photograph (n=117; 100%) over a drawn picture (n=0). Australian respondents also preferred a photograph (n=43; 84%) over a drawn picture (n=8; 16%).

- Beverage stimuli should be photographic and should include at least Beer, Vodka and Wine as popular and recognisable beverages.

Phase 2

- 15 beverage items were finalised for Phase 3 testing. These consisted of alcoholic (n = 5) and non-alcoholic beverages (n = 10, see Table 1 for a breakdown of items).

Table 1 Contents summary of beverage images

Drink Name	Container	Vessel
Beer	Bottle	Pint Glass
Champagne	Bottle	Flute Glass
Coffee	Percolator	Espresso Cup
Cola	Bottle	Cola Branded Glass
Cordial	Bottle	Tumbler Glass
Energy Drink	Can	Small Glass
Juice	Bottle	Tumbler Glass
Smoothie	Bottle	Half Pint Glass
Tea	Transparent Teapot	Mug
Vodka	Bottle	Shot Glass
Water	Bottle	Half Pint Glass
Whisky	Bottle	Rocks Glass
Wine	Bottle	Wine Glass
Sports Drink[2]	Bottle	Sports Drink Bottle
Sports Drink[3]	Bottle	Sports Drink Bottle

- 16 emotion images were developed for Phase 3 testing, the details of which are in Table 2.

[2] Depicting a bottle of Lucozade
[3] Depicting a bottle of Powerade

Table 2 Description of Consumable Content

Scenarios	Persons	Emotions
Watching Television	1 man	Sedation Positive, Sedation Negative, Arousal Positive, Arousal Negative
Watching Television	1 woman	Sedation Positive, Sedation Negative, Arousal Positive, Arousal Negative
Eating Dinner	1 man, 1 woman	Sedation Positive, Sedation Negative, Arousal Positive, Arousal Negative
Social Gathering	2 men, 2 women	Sedation Positive, Sedation Negative, Arousal Positive, Arousal Negative

- Each greyscale drawing scenario had four variations to represent the four factors of Russell's (1980) CMA (see Figure 2 for examples).

Phase 3

Inverse efficiency scores in response to beverage pictures

- Mean IES was not significantly different between non-alcoholic and alcoholic drinks.
- Age only had a significant relationship with efficiency to non-alcoholic drinks, suggesting less efficient responses to non-alcoholic drinks as age increased (there was no such relationship for alcoholic drinks – See Figure 4).

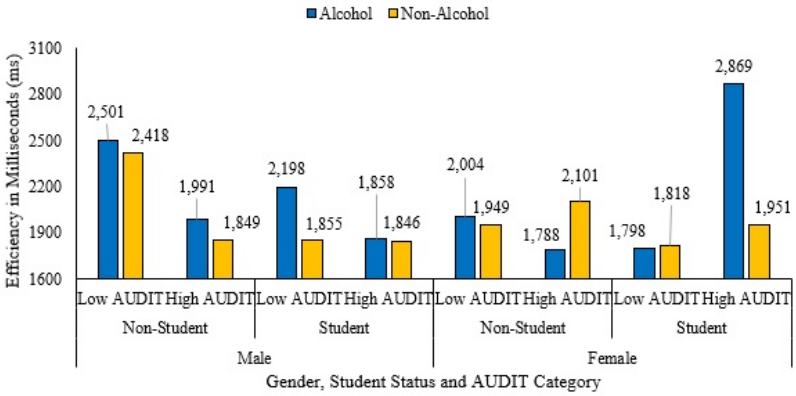

Figure 4 Mean Efficiency Scores in Response to Alcoholic and Non-Alcoholic Drinks

- IES was significantly different between each beverage. Mean IES for each drink is displayed in Table 3.
- Mean responses to Cola were significantly more efficient than to all other beverages (*ps*<.05).
- Responses to Cordial had the poorest efficiency, and was statistically similar to Sports Drink (Lucozade), Energy Drink and Champagne.
- Responses to Wine were the most efficient of those in the alcoholic beverage category, and these responses were statistically compatible to vodka, beer and whisky.
- Age had moderate positive relationships with Energy Drink, Vodka, and Sports Drink (Powerade).

Table 3 Inverse Efficiency Responses to 15 Alcoholic and Non-Alcoholic Beverages (Most to Least efficient; Left-Right)

Non-Alcoholic	Mean (SD)
Cola	1521 (811)
Coffee	1746 (568)
Smoothie	1767 (567)
Powerade	1790 (690)
Tea	1795 (766)
Water	1977 (750)
Juice	2075 (873)
Lucozade	2232 (1014)
Energy Drink	2513 (2127)
Cordial	2661 (1227)
Alcoholic	
Wine	1760 (585)
Vodka	1962 (591)
Whisky	2011 (705)
Beer	2143 (807)
Champagne	2467 (1464)

Inverse efficiency scores in response to emotion stimuli

- Responses to positive and negative valence images were not significantly different
- Responses to emotionally aroused images were significantly more efficient than sedate images (see Figure 5).
- Age did not have a significant relationship to response efficiency.
- There were no significant differences in response accuracy by gender, student status or AUDIT for each image scenario, level of valence, or level of arousal.

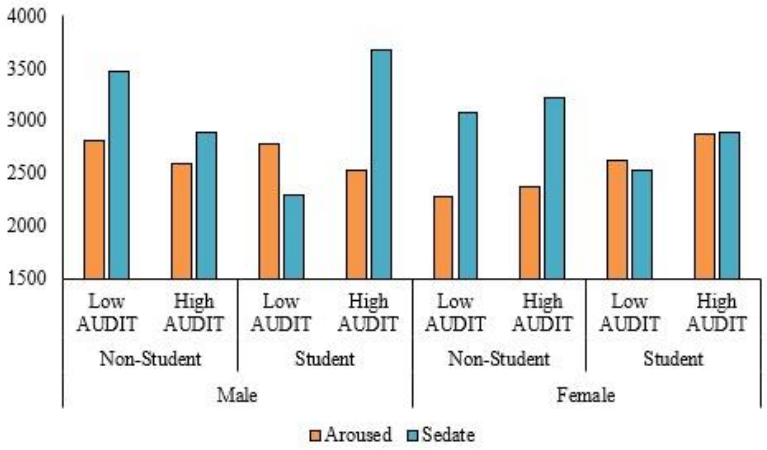

Figure 5 Mean Response Accuracy to Aroused and Sedate Images

Phase 4

Confirmatory Factor Analyses

- Participants consistently attributed alcohol across the four expectancy dimensions – positive arousal (M = 5.45, SD = 2.45), positive sedation (M = 4.71, SD 2.42), negative

arousal (M = 5.18, SD = 2.49) and negative sedation (M = 4.14, SD = 2.64), indicating a deliberate and clear association between alcohol and the expectancy dimensions (that is attributions were not random).

- With CFI and TLI values of .95, and RMSEA of .05, the four-factor model proved to be a good fit for alcohol related expectancies (see Table 4).

Table 4 Results of the Confirmatory Factor Analysis (CFA)

	Model fit						Comparison		
	X^2	df	CFI	TLI	RMSEA (90% CI)	SRMR	ΔX^2	df	*p*
Four-factor model	2003.634	454	.950	.945	0.054 (.051 to 0.056)	0.086	_	_	_
Two-factor models									
Positive versus Negative	5980.987	463	.821	.808	0.100 (.098 to .102)	0.139	3977.353	9	0.00
Arousal versus Sedation	9138.197	463	.719	.698	0.125 (.123 to .128)	0.197	7134.563	9	0.00

- The strength of the four-factor model was also supported by the weak model fits for the two 2-factor models (positive versus negative and arousal versus sedation) which were significant worse than the four-factor model. Most items loaded highly on the factor to which they belonged, that is all factor loadings were above 0.6 (see Table 5).

Table 5 Standardized Factor Loadings (CFA Four-factor model) and Interfactor Correlations Obtained by the CFA

	Arousal Positive	Arousal Negative	Sedation Positive	Sedation Negative	% Alcohol[1]
Scenario 3, Person 1	0.606				68.5
Scenario 7, Person 1	0.541				57.2
Scenario 11, Person 1	0.860				67.6
Scenario 11, Person 2	0.920				67.8
Scenario 11, Person 3	0.902				68.9
Scenario 11, Person 4	0.819				66.2
Scenario 16, Person 1	0.644				74.7
Scenario 16, Person 2	0.665				74.4
Scenario 1, Person 1		0.680			71.8
Scenario 5, Person1		0.628			60.4
Scenario 9, Person 1		0.836			63.6
Scenario 9, Person 2		0.874			64.1

Scenario 9, Person 3		0.901			64.7
Scenario 9, Person 4		0.778			63.1
Scenario 14, Person 1		0.626			67.4
Scenario 14, Person 2		0.622			62.9
Scenario 4, Person 1			0.582		61.3
Scenario 8, Person 1			0.413		54.1
Scenario 12, Person 1			0.839		54.0
Scenario 12, Person 2			0.904		56.3
Scenario 12, Person 3			0.916		55.0
Scenario 12, Person 4			0.784		54.7
Scenario 17, Person 1			0.559		67.4
Scenario 17, Person 2			0.536		68.1
Scenario 2, Person 1				0.646	59.4
Scenario 6, Person 1				0.577	55.0
Scenario 10, Person 1				0.892	51.8
Scenario 10, Person 2				0.910	49.8
Scenario 10, Person 3				0.938	49.4
Scenario 10, Person 4				0.852	49.9
Scenario 15, Person 1				0.526	49.3
Scenario 15, Person 2				0.515	50.0
KR20	.816	.810	.768	.815	
Correlation with					
Arousal Negative	0.132				
Sedation Positive	0.221	0.115			
Sedation Negative	0.108	0.257	0.109		

[1] Percentage of alcohol attributed to the person in the scenario.

- Nearly all arousal items (assigning an alcoholic beverage to the individuals in the scenarios or not) loaded highly and significantly on the factor to which they belong, that is factor loadings were above 0.6. The interfactor correlations varied between .108 and .257 (see Table 2).

RAET and Alcohol Use

- The expectancy task was significantly negatively correlated with one's own *binge* alcohol use for negative sedation expectancies (r = -.059, p = .041), but was not significantly correlated with one's own alcohol use for the other expectancy dimensions for *binge use* (e.g. positive arousal r = -.031, p = .290).
- The task was significantly positively correlated with one's own *quantity/frequency* for positive sedation expectancies (r = .068, p = .019), but was not significantly correlated with any of the expectancy dimensions for *quantity/frequency* alcohol use (e.g. positive arousal r = .044, p = .126).

Discussion

The aim of this research was to document a systematic approach to developing stimuli suitable for inclusion in pictogram-based assessments of alcohol expectancies. Since the beverages are intended to be matched with scenes displaying different emotions in a revision of the Alcohol Expectancy Task (Kuntsche & Kuntsche, 2017), it is important that the selected drinks are not only recognisable in a passive image (Monk & Heim, 2014; Pronk et al., 2015) but are applicable to the affective contexts in which they are presented. Likewise, the scenarios must clearly represent each factor of the CMA (Posner, Russell, & Peterson, 2005; Russell, 1980).

Phase 1 and 2

Participants indicated that Beer, Wine and Vodka were the most popular alcoholic beverages and that photographs were the preferred medium of presentation. Professional photographs of alcoholic and non-alcoholic beverages were produced so as to standardise the position of drinking container and vessel, hide banding labels and control lighting.

Professionally produced, black and white drawings were developed to display characters in everyday scenarios, exhibiting different emotions. This was done in a systematic way by displaying all the four emotional categories of the CME consistently in three settings with a different degree of social involvement (alone, couple, social gathering).

Phase 3

Beverages

Response efficiency was consistent between both alcoholic and non-alcoholic beverages displayed, suggesting that participants could accurately and rapidly identify photographs of beverages regardless of whether they contained alcohol or not. Nine of the fifteen beverages had statistically similar responses. Cola was responded to significantly more efficiently than the other beverages, which corroborates previous findings regarding a potent behavioural preference for Coca-Cola due to the cultural influence of the brand (McClure et al., 2004). This suggests that this beverage would warrant inclusion in tasks requiring quick and accurate beverage recognition, such as in the RAET.

Conversely, the current results suggest that Lucozade (Sports Drink) and Cordial were the weakest candidates for inclusion, at least among the mainly adult participants in our sample. Cordial was mistaken for Juice and vice-versa. Similarly, Lucozade and Energy Drink were misidentified as each other, which implied these beverages were not distinct enough conceptually. On the other hand, Powerade was efficiently responded to, suggesting it was a more coherent representation of a sports drink than Lucozade. Although the Energy Drink was responded to more efficiently than Lucozade, the presence of a more recognisable Sports Drink stimulus may mean that it is justifiable to exclude Lucozade.

That responses to Cordial, Lucozade and Energy Drink were equally as inefficient as responses to alcoholic items of Whisky and Champagne may also warrant consideration for the development of a task such as the AET. Specifically, efficiency scores for Champagne were the poorest of all the alcoholic items. While identifying the beverage accurately, participants appeared to spend a long time choosing the correct label from

the word selection. It is possible that the label ‘Wine’ may have been ambiguous by not specifying colour; a photograph of red wine was used for this category, so some participants may have taken extra time to consider whether Champagne could be labelled as white wine. Researchers considering which stimuli to include in future assessments may therefore be advised to consider this finding carefully and avoid the inclusion of Champagne, particularly if reaction time is an important consideration. Nevertheless, the association between Champagne and celebration (Charters et al., 2011), may mean that Champagne is a contextually important beverage to include in assessments such as the AET, where context and affect are particularly of interest.

Out of all the alcoholic beverages we tested, Wine was the most efficiently responded to item. Participants appeared readily able to quickly and accurately recognise the item perhaps because wine is a particularly popular alcoholic beverage among the adults included, making it a potentially useful inclusion in visual tasks such as the RAET. While Vodka was recognised less efficiently than Cola, it was not significantly different from Wine in terms of recognisability. This is despite the fact that Vodka is ostensibly conceptually dissimilar from the other beverages that we tested as it is less commonly consumed unmixed outside of ‘drinking-to-get-drunk scenarios’ (Verster et al., 2018). This stands in contrast to Beer, Wine and Whisky, which are commonly consumed unmixed in the same form that was photographed. Pictographic measures such as the refined AET may therefore wish to consider these alcoholic beverages for inclusion in testing.

Age was significantly and positively associated with responses to non-alcoholic drinks, in that older participants reacted less efficiently (so slower/less accurate) to non-alcoholic drinks (while there were no age-related differences for alcoholic beverages). This may be explained by patterns of elevated consumption and brand awareness of calorific soft drinks amongst younger people (Hattersley, Irwin, King, & Allman-Farinelli, 2009; Tatlow-Golden, Hennessy, Dean, & Hollywood, 2014) . Responses to each beverage did not differ significantly by gender, student status or AUDIT score. This is important because it means that the beverages are recognisable independent of these characteristics and thus suitable to be included in a task such as the RAET for different subgroups.

Emotional Scenarios

Responses differed significantly depending on the degree of depicted emotional activity displayed in the scenes. Participants responded more efficiently to aroused scenes, implying the sedate images were more challenging to identify. Interestingly, responses did not differ by valence, which stands in contrast to previous studies that have found negative words (Kuperman, Estes, Brysbaert, & Warriner, 2014) and images (Thigpen, Keil, & Freund, 2018) are recognised more slowly than positive words. Our findings may be due to the use of short, high frequency words such as ‘Angry’ and stimuli that are negative but not unpleasant/aversive and tend to garner faster responses (Ihssen & Keil, 2013). Regardless, this finding confirms the positive and negative versions of each scenario were clearly depicted and are valid for use in visual tasks such as the RAET. Since the two weakest emotional scenes shared the same valence and activation (sedation-positive) we decided to delve deeper into participant responses to account for any confounding reasons why they were not responded to as efficiently as the other scenarios. The sedate scenes are particularly salient because sedation is related to negative alcohol expectancies (Wiers, 2008). While the majority of incorrect responses chose an arousal-positive label, the most common label chosen was ‘Joyful’ rather than ‘Excited’. Posner and colleagues conceptualised joy as having strong positive valence

but moderate arousal, meaning ‘Joyful’ could be applied to low or high activation of positive affect (Posner et al., 2005). Due to the ambiguity of ‘joy’ it is possible that participants selected a correct label when applying it to both the sedation-positive and arousal-positive scenarios. We would therefore recommend that researchers consider carefully the adjectives they use when representing emotional scenes (or avoid them where possible, to avoid such potential confusion).

Neither age, gender, AUDIT score or student status was significantly related to response efficiency for the image scenarios, valence and activations, which again underlines the robustness of the emotional stimuli identification across these subgroups.

Phase 4

Validation

The aim of the validation component of this study was to examine the cognitive structure of the RAET in relation to the CMA, and to investigate whether this tool had any predictive utility in terms of drinking patterns. The results of the CFA demonstrate adequate psychometric validation for the four-factor model used in the RAET. This was evidenced by the strong CFI and RMSEA values for the four-factor model and comparatively weak model fits for the two factor models (Hooper et al., 2008). In this sense, the RAET appears to successfully assess alcohol expectancies, expressed in terms of emotions classified by the CMA (Russell, 1980) which individuals think will occur when people drink alcohol.

Despite the results of the CFA demonstrating that participants’ attributions conformed to the psychometric properties of the task, the expectancy dimensions, as assessed by the RAET, seemed to be independent of drinking habits. That is, the RAET was significantly negatively correlated with respondents’ own alcohol use. While the initial absence of predictive utility for the RAET was an unexpected finding (and contradictory to previous research (Fromme, Stroot, & Kaplan, 1993; Leigh & Stacy, 1993), we postulate that this may be the result of several factors. First, there are differences in the structure of the RAET as opposed to previous questionnaire-based methods (Brown, Christiansen, & Goldman, 1987; Brown, Goldman, & Christiansen, 1985), which have found that personal expectancies (assessed via a questionnaire) were significantly correlated with respondents’ alcohol use. Questionnaires explicitly assess participants’ personal expectancies, that is expectancies they held about their own alcohol consumption (i.e., when you drink alcohol, how likely is it that the following would happen?), whereas the RAET determines expectancies through associative responding, in this case the expectancies depicted visually by someone else (a man or women depicted in the illustrations). Furthermore, the predictive utility of expectancies begins to diminish once consumption has begun, with motives becoming more important in the prediction of alcohol use (Kuntsche, Knibbe, Engels, & Gmel, 2007; Kuntsche, Wiers, Janssen, & Gmel, 2010), this being pertinent among our sample of adults. Finally, based on the finding that expectancy dimensions are independent of drinking habits, it is possible to conclude that light and non-drinkers also hold expectancies, supporting conclusions drawn from previous research that expectancies exist irrespective of personal experience (Goldman, 1994).

Above and beyond these factors, it may also be worth considering whether the absence of predictive utility in terms of self-reported consumption may be the result of limitations in the previously hypothesised link between motives and expectancies. That is, based on

current findings it is possible to speculate that previously reported links may be an artefact of the self-report system, and that the predictive link to alcohol use may be weaker when people are not presented with a predefined association. While interesting to consider, such questions need to be examined in greater depth with is beyond the scope of the present study. A potential limitation of the current study which may be linked to the absence of predictive validity, is that as expectancies are highly linked with both norms and motives. This means that there is a chance that what the RAET measures is not an explicit or exclusive expectancy concept. Instead the RAET may also measuring these other interlinked concepts, just as previous expectancy measures have been suggested to tap into both the pharmacological effects and situational aspects of drinking (Brown et al., 1985; Fromme et al., 1993). While disentangling the three concepts would be challenging, again, we propose that the conceptual implications may be worthwhile exploring, in relation to pictographic measures, in more depth elsewhere. Importantly however, these questions do not diminish the strength of the cognitive structure for expectancies that we have found but are worth bearing in mind when interpreting findings of research that utilises the task in hand.

Limitations

As mentioned above, participant responses may have been confounded by the label choices for each emotion circumplex factor. Future replications should choose words directly from the CMA in order to avoid ambiguity or overlap between factors (Barrett, 1998). Additionally, the presence of eight words to describe four factors may have provided too many potential responses for participants (Albantakis, Branzi, Costa, & Deco, 2012). Examination of participant responses supports this, because most tended to pick one word (typically the neutral label) and stuck with it for each variation of the scenarios. This is especially salient considering there was only one correct label presented for the consumable blocks. Future studies may also endeavour to use a different controller (such as a touch screen or mouse) to collect participant responses. Alternatively, a gap could be programmed between each image, to prevent registering responses from button presses too close in succession.

While this study has demonstrated the psychometric validation of the refined task among an adult population sample, future research should look to administer this task in a range of population groups, including treatment samples and among younger children. For children in particular, expectancies have been shown to exist before first experience with alcohol (Donovan et al., 2004; Kuntsche & Kuntsche, 2017), as those without experience will be guided by their existing expectations about a substance. Finally, researchers should also look to obtain longitudinal data to establish test-retest reliability, as well as the utility of this measure overtime.

Conclusion

Scenario-based assessment of alcohol-related beliefs are advantageous as they avoid the presentation of predefined associations (e.g., “drinking = happiness”) which may mean that that responses are an artefact of the questioning process rather than a true reflection of beliefs or states. The presented results provide a solid basis for a more systematic development of the scenario-based assessment of alcohol expectancies. By maximising the transparency of the stimuli selection, development and assessment process, researchers can examine critically the beverage and emotion stimuli that may be incorporated into tasks such as the RAET and provide assurances that they are recognisable, valid and reliable.

The current study also afforded initial psychometric validation of the Refined Alcohol Expectancy Task in terms of suitability to assess expectancies. In this way the RAET builds on the advantages of previous versions of the task to provide researchers with a cognitively sound measurement tool. However further research is needed to determine the tools overall usefulness in a range of settings, both research and clinical, and for more specific population groups, i.e. young children.

Appendices

Appendix 1 Example Emotion Pictographs

Appendix 1 – Example beverage pictographs

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