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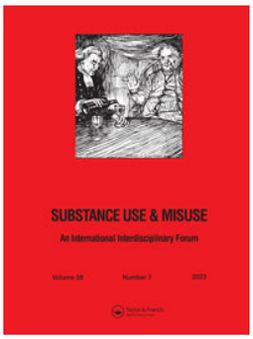

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ORIGINAL ARTICLE

Attempts to Influence the Value of Alcohol by Manipulating Social Influence and Context

Jack Yates[a], Abigail K. Rose[b] and Andrew Jones[b]

[a]Department of Psychology, University of Liverpool, Liverpool, UK; [b]School of Psychology, Liverpool John Moore's University, Liverpool, UK

ABSTRACT

Background: Recent cognitive neuroscience models of value-based decision-making suggest value-based choices for alcohol are sensitive to various inputs, such as context and social influence. In two online experiments, we tested whether manipulating these inputs influenced proxies for alcohol value. *Experiment 1*: 157 social drinkers were presented with 4 hypothetical scenarios (drinking alone, with friends who are also drinking, with friends but trying to "cut-down" for health reasons, with friends who aren't drinking) in a within-subjects design, and completed the Brief Assessment of Alcohol Demand after each as a measure of value. Value for alcohol (number of drinks purchased) was greatest when drinking with friends who were also drinking compared to drinking alone ($d=0.95$), friends not drinking ($d=1.49$) and friends drinking/health related ($d=1.59$). Value for alcohol was also greater when drinking alone compared to with friends who were not drinking ($d=0.55$), and also with friends drinking/health related ($d=0.62$). *Experiment 2*: 241 participants were randomly allocated to see one of four categories of images in a 2 (context: bar vs house) x 2 (social influence: enjoy vs not enjoy) design, before completing a Concurrent Choice Task for alcohol and Visual Analog Scales. There were no significant effects found on either task, both taken as proxies for value. *Conclusion*: There was inconclusive evidence that the value for alcohol could be manipulated by social context. This could be explained by greater saliency of the manipulation in asking participants to imagine themselves in a hypothetical situation as opposed to presenting images depicting drinking scenarios.

KEYWORDS
Addiction; value-based decision-making; alcohol; demand; concurrent choice

Introduction

Worldwide, excessive alcohol use is associated with considerable and far-reaching consequences from acute and long-term health conditions (Rehm et al., 2017), but also productive days lost (Gmel & Rehm, 2003), and criminal behaviors (Rehm et al., 2009). However, despite widespread knowledge of these negative outcomes (Babor et al., 2010), many individuals still choose to consume alcohol in excess.

The majority of theoretical models focus on behavioral self-control as a key driver of alcohol consumption and drinking beyond (self-imposed) limits. However, empirical evidence often fails to support the claims of these models (Bickel et al., 2007; Goldstein & Volkow, 2011; Heatherton & Tice, 1994). For example, multiple laboratory-based studies have failed to find an association between computerized measures of behavioral control (e.g., Stop Signal tasks) and alcohol use (Baines et al., 2019; Baines & Jones, 2021; Jones et al., 2013). Furthermore, meta-analyses of the association between behavioral control and alcohol use suggest weak evidence, at best (Smith & Mattick, 2018).

Given this lack of empirical support, theoretical models have recently shifted away from effortful inhibition as an explanation for failures in self-regulation (Berkman et al., 2017; Fujita, 2011). Instead, they argue that self-regulation may be better conceptualized as a value-based choice. The values for each competing option (e.g. alcohol vs. alternatives) are derived from integrating various tangible gains and costs (for example, physical rewards, effort, and time costs), social gains and costs (for example, group acceptance, status, and power increases/decreases) and self-related gains and costs (for example, self-affirmation, threat of agency loss). These are known collectively as *value inputs*. Computationally the option's subjective value is described as the weighted sum of choice-relevant attributes, where these weights are not strictly rational but are instead modulated by "choice anomalies." This means that they can vary by person, context, and time.

Berkman and colleagues' influential model has yet to be readily applied to alcohol-use, however a review by Hogarth and Field (2020) does demonstrate the potential of its application by showing how a proxy for the value of alcohol can be manipulated. Hogarth and Field (2020) found that drug vs non-drug alternative choice (when assessed using concurrent choice tasks) is consistently modulated by various drug devaluations (e.g., imposition of costs or punishment,

CONTACT Jack Yates J.D.Yates@liverpool.ac.uk Department of Psychology, University of Liverpool, Eleanor Rathbone Building, Bedford Street South, Liverpool L697ZA, UK.

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as well as negative mood induction). Moreover, individual differences in severity of alcohol and substance-use disorders were associated with drug preference but no individual differences in sensitivity to drug devaluation. This suggests that vulnerability to addiction is characterized by a greater value ascribed to drugs and not by a habit or compulsion as some dual-process theories might suggest (Bickel et al., 2018; Hogarth & Field, 2020).

Whilst the direct application of value-based decision-making (VBDM) to alcohol use is limited, there is a body of work that examines how contextual factors - such as what could be identified as value inputs in Berkman's model - influence alcohol cognitions and behavior. For example, Monk and Heim (2014), using an ecological momentary assessment, identified that social and environmental contexts account for a significant proportion of variance in outcome expectancies related to alcohol use. Particularly prompts that occurred in a typical drinking situation, such as a pub, bar or club, were associated with heightened outcome expectancies when compared with other settings, as did those prompts that occurred when the participant was in a social setting with multiple people. Moreover, Monk and Heim (2013) using panoramic filming and projection to simulate environments, found that participants' positive outcome expectancies were higher and drink refusal self-efficacy lower in a simulated bar environment, compared to a lecture theater environment and when completed in a peer group compared with when completed alone. This highlights that a simulated environment has the same pattern of results as an in-vivo environment. If this work is viewed through a framework of VBDM it could be argued that greater positive outcome expectancies and lower drink refusal self-efficacy suggest that these social and environmental factors alter the subjective value of alcohol. A systematic review (Stanesby et al., 2019) also found that location and drinking group characteristics were important drivers of whether an individual engages in a heavy drinking session, suggesting that this greater value attributed by social and environmental factors does drive actual drinking behavior. However, the relationship isn't always apparent. Monk et al. (2020), again using ecological momentary assessment, found that neither positive or negative outcome expectancies related to alcohol were predictors of actual drinking behavior. Despite this, based on the evidence it is likely social and environmental contexts such as drinking in a bar or with friends would act as value inputs and increase the subjective value of alcohol. Moreover, a recent study demonstrated how demand for cannabis could be influenced by manipulating social context and opportunity cost (Acuff et al., 2023) suggesting external inputs do alter demand which could be assumed reflects the value of an option.

The current article aimed to expand the previous work by directly testing the prediction made in the VBDM model of self-control, such that the subjective value of an option can be altered by manipulating value inputs identified in the model, in particular value inputs derived from social influence and context. This will also be an attempt to combine the currently disparate literatures of the effects of context on alcohol and VBDM. By devising two experiments that test whether various value inputs manipulating context can be used to alter the subjective value of alcohol, we can also determine the applicability of the VBDM in understanding alcohol.

Experiment 1 used hypothetical drinking scenarios to determine if the subjective value of alcohol could be influenced by manipulating value inputs based on social influence and situational context. Based on the context literature (Monk & Heim, 2013, 2014; Stanesby et al., 2019) it was hypothesized that the "Friends Drinking" scenario representing a "Social Acceptance" value input would have a higher score across all three indices of the Brief Assessment of Alcohol Demand (BAAD) compared with the other three scenarios "Alone," "Friends not Drinking," and "Friends Drinking/Health Related" which represent a lack of "Social Acceptance/Rejection," "Social Rejection," and "Social Acceptance/Autonomy" value inputs respectively. It was also hypothesized that Omax, Breakpoint, and Intensity would be correlated with AUD symptom severity, assessed by the Alcohol-use Disorder Identification Test (AUDIT).

In study 2 images of drinking scenes depicting people enjoying alcohol in a bar or house setting and people not enjoying alcohol in a bar or house setting were used to test the effect of social influence and context. It was predicted that there would be main effect of social influence (people enjoying alcohol vs not enjoying alcohol) on value as measured by number of times alcohol is chosen in the Concurrent Choice task (CCT) and a higher Visual Analog Scale (VAS) rating with a higher value in the enjoy alcohol image conditions. We also predicted a main effect of context (bar setting vs house setting) as measured by number of times alcohol is chosen in the CCT and a higher VAS rating with a higher value in the bar setting than the house setting. We also predict a significant interaction of social influence and context on value as measured by number of times alcohol is chosen in the CCT and a higher VAS rating). It was also hypothesized that AUDIT score, would be associated with the subjective value of alcohol. Finally, it was hypothesized that the results in experiment 2 would have the same pattern of results as experiment 1.

Experiment 1

Method

Participants

One-hundred and seventy-four participants were recruited into the experiment. There were $N = 125$ females (72%), with the average age of the sample (mean = 27.71 SD = 11.79). Thirteen participants were removed for failing to complete the experiment and an additional 4 participants were removed for failing an attention check (discussed in procedure), therefore the final analytical sample was 157 participants (113 female). A-priori sample size calculation using G*power analysis determined $n = 156$ would be the sample size to achieve 80% power (Cohen, 1988), to detect a medium effect size ($f = 0.25$) at a significance level of .05.

To be eligible for inclusion, participants were required to be 18+ years, and consume alcohol regularly (designated as at least one drinking occasion per week, and at least 10 units per week on average). Participants were excluded if they had a previous or current diagnosis of alcohol use disorder. This study was granted ethical approval by the host university's ethics committee. Participants were recruited *via* a university participant recruitment scheme in exchange for course credit, social media, a mailing list, and the crowd-sourcing platform Prolific. Participants were compensated £1 for their participation.

Materials

Brief assessment of alcohol demand (BAAD) (Owens et al., 2015)

The BAAD is a three-item measure used to assess the most widely used indices of alcohol demand: Intensity, Omax, and Breakpoint. Each index provides a different way of understanding an individual's demand or value for alcohol. The intensity of demand (the maximum consumption at no cost) is considered to be a pure index of the value of alcohol, unaffected by cost. Intensity was measured using the question "If drinks were free, how many would you have?" Responses to this question were given in number of drinks and choices ranged from 0-10, in 1 drink increments, with a final choice of 10+ (coded as 11). Omax (peak expenditure) is the greatest expenditure an individual is willing to spend on a substance across prices. Unlike Intensity, Omax is sensitive to both alcohol value and cost sensitivity. Omax was measured using the question "What is the maximum total amount you would spend on drinking during that drinking occasion?" Responses to this question were given in pounds and choices ranged from £0-£30, in £5 increments with a final choice of £30+. Breakpoint is defined as the price at which the consumption of a substance is completely suppressed, as in what price point would an individual no longer consume the substance. As with Omax, Breakpoint is sensitive to both alcohol value and cost sensitivity. Breakpoint is measured using the question "What is the maximum amount you would pay for a single drink?" Responses to this question were given in pounds and choices ranged from £0-£15, in £1 increments, with a final choice of £15+. BAAD demonstrates concurrent validity for alcohol reinforcement, demonstrating reliable correlations (rs between .132 – .494), in a meta-analysis of 50 studies (Martínez-Loredo et al., 2021). Intensity demonstrates the strongest correlation with alcohol use (r = .494 [95% CI: .461; .526]) and as such we used this as our primary outcome.

Alcohol-use disorder identification test (AUDIT) (Saunders et al., 1993)

The AUDIT is a scale assessing quantity and frequency of alcohol-use, as well as behavior associated with drinking and its consequences. The AUDIT contains 10 items. For example, "How many drinks containing alcohol do you have on a typical day when you're drinking." Scores range from 0 to 40, with a score ≥ 8 for men and ≥ 7 for women taken to indicate hazardous alcohol-use. The AUDIT for experiment 1 had excellent internal consistency (α = .89).

Procedure

Once recruited participants were given a link to a Qualtrics survey. Participants first gave informed consent and then completed the AUDIT, BIS-11 and M-DMQ-R (data reported in supplementary materials). After the initial questionnaires, participants were then presented with four hypothetical scenarios in turn. Each scenario was designed to manipulate the relative value of alcohol by using Berkman's proposed value inputs. The "Alone" scenario was presented first to participants as follows "You are in a pub/bar alone, and you are not planning to meet anybody else. It is approximately 7 pm and you plan to stay until the pub/bar closes at 11 pm. You do not plan to continue drinking after the pub closes." The second "Friends Drinking" scenario was then presented "You are in a pub/bar with friends and they are all drinking alcohol. It is approximately 7 pm and you plan to stay until the pub/bar closes at 11 pm. You do not plan to continue drinking after the pub closes." The "Friends Not Drinking" scenario was presented next "You are in a pub/bar with friends and they are not drinking alcohol. It is approximately 7 pm and you plan to stay until the pub/bar closes at 11 pm. You do not plan to continue drinking after the pub closes." Finally, the "Friends Drinking/Health Related" scenario was presented "You are in a pub/bar with friends who are consuming alcohol. However, you have been thinking about your health lately and are trying to cut down on your alcohol consumption. It is approximately 7 pm and you plan to stay until the pub/bar closes at 11 pm. You do not plan to continue drinking after the pub closes." After each scenario was presented, participants were required to complete the 3 indices of the BAAD before being presented with the next scenario. To ensure a greater level of control the scenarios differ only in the part of the statement that would alter the valuation of alcohol and the rest of the statement remains the same. At a mid-point of the survey participants were asked "are you paying attention? Please leave this blank" any response was considered a failure of the check and those participants were subsequently excluded from analysis as recommended by Jones et al. (2022). Once all questionnaires were completed, participants were presented with a debrief sheet to read and the survey was closed. The entire survey lasted approximately 15 min.

Analysis strategy

Data was analyzed using 3 separate ANOVAs where the independent variable is the hypothetical scenario presented and the dependent variables being the BAAD measures Intensity, Omax, and Breakpoint. Correlations were performed between Intensity, Omax, and Breakpoints of each hypothetical scenario and AUDIT score (reported in online supplementary materials).

Results

Participant characteristics

Table 1 summarizes the participant characteristics of the current samples. All of the sample in experiment 1 scored >8 on the AUDIT classifying them as hazardous drinkers. The majority of the sample were in full-time education (51.1%) followed by full-time employment (31%).

Intensity

A repeated measures ANOVA was conducted to determine the effect of scenario on Intensity. Maulchy's test indicated that sphericity was met (X^2 (5) = 9.88, p = .079).

Figure 1 shows scores from the Intensity measure of the BAAD across hypothetical scenarios.

Table 1. Participant characteristics and measures (means ± SD).

	Experiment 1	Experiment 2
Age	27.46 (11.90)	43.26 (14.16)
AUDIT	20.25 (4.97)	9.18 (6.31)
BIS-11	64.56 (11.25)	60.91 (11.13)
M-DMQ-R Social	18.32 (4.16)	17.01 (4.83)
M-DMQ-R Coping Anxiety	11.97 (3.39)	12.07 (3.87)
M-DMQ-R Coping Depression	15.24 (7.21)	16.65 (8.56)
M-DMQ-R Enhancement	15.19 (4.68)	13.69 (4.59)
M-DMQ-R Conformity	7.42 (3.31)	7.16 (3.24)

This table presents participant characteristics for the current sample and sample 2.
Note: A total M-DMQ-R score would be interpretively useless as the sub-scales qualitatively conflict with each other.

There was a significant main effect of the scenario on BAAD Intensity (F (3,465) = 175.72, p < .001, ηp^2 = .53, BF^{10} > 99).

Table 2 shows the post-hoc paired samples t-test results across hypothetical scenarios.

Omax and breakpoint

The pattern of results for Omax and Breakpoint were the same as intensity (see supplementary online materials).

Experiment 1 Discussion

Using a novel task of hypothetical scenarios designed to elicit various value inputs, identified in a recent VBDM model of self-control (Berkman et al., 2017), we aimed to investigate if the subjective value of alcohol could be manipulated. The findings from this experiment demonstrate that perceived social context effectively manipulated the reported value of alcohol, with alcohol being most valued under conditions of "Friends Drinking" followed by "Alone" and then with "Friends not Drinking" and "Friends Drinking/Health related" being the least valued conditions, thus supporting the first hypothesis. However, this evidence is limited by the use of a hypothetical self-report measure as a proxy for alcohol-value, which is likely to have led to inflated effect sizes (Xu et al., 2016) and may not generalize to real-world behavior (Masterton et al., 2022). Therefore, for Experiment 2, a CCT was used to overcome this

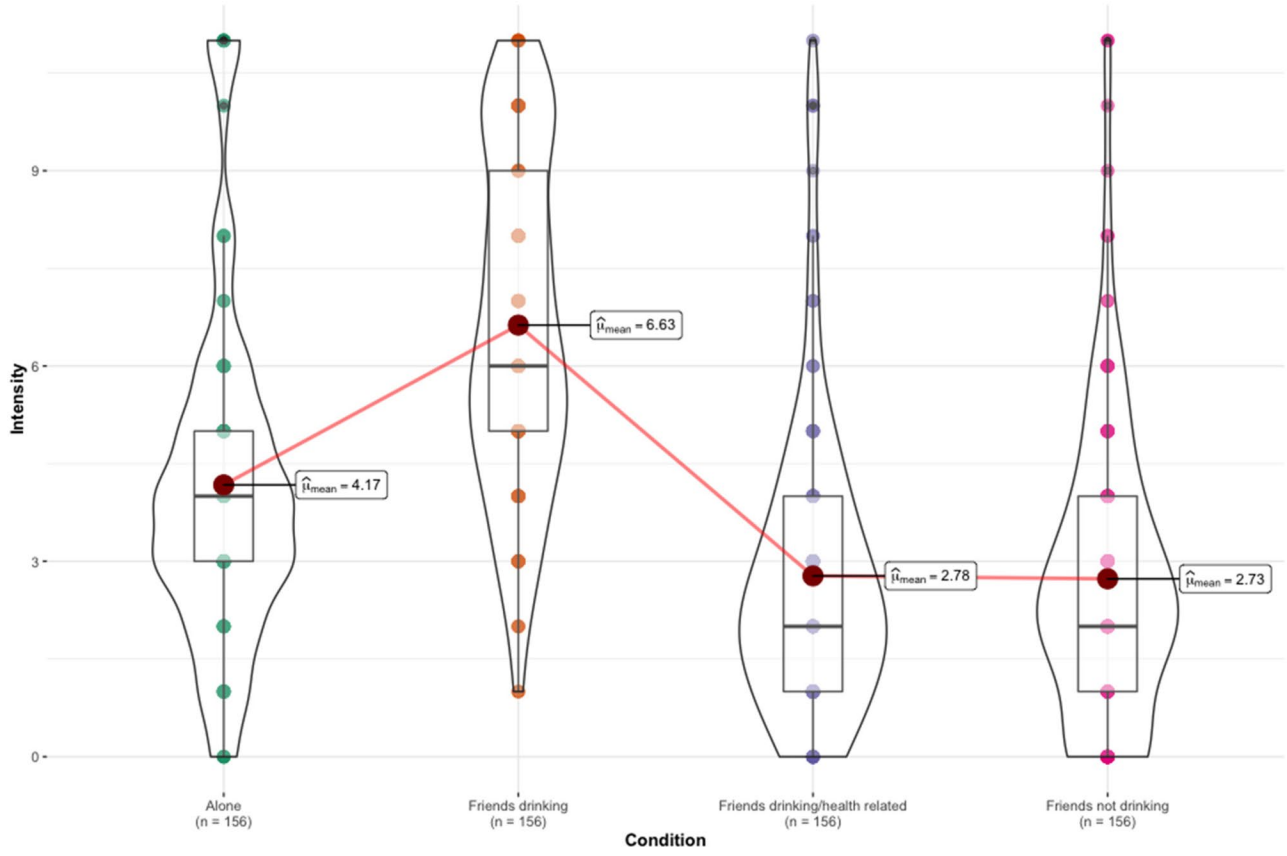

Figure 1. Shows the highest BAAD Intensity score was in "friends drinking."

Table 2. Post hoc paired samples t-test results across hypothetical scenarios with means (±SD).

	M (±SD)	Friends drinking	Alone	Friends not drinking	Friends drinking/health related
Friends drinking	6.60 (2.54)		t (155) = 12.92 p < .001 d=0.95	t (155) = 18.40, p < .001 d=1.49	t (155) = 21.57 p < .001 d=1.59
Alone	4.17 (2.55)			t (155) = 6.88 p < .001 d=0.55	t (155) = 7.21, p < .001 d=0.62
Friends not drinking	2.73 (2.24)				t (155) = 0.24, p = .807 d=0.02
Friends drinking/health related	2.78 (2.24)				

This table presents post hoc paired samples t-test results across hypothetical scenarios for experiment 1.

limitation. Additionally, the scenarios were always presented in the same order which may have affected the value placed on subsequent scenarios due to the exposure to the previous scenario. Experiment 2 addressed this by being between subjects with participants only viewing a single experimental condition.

Experiment 2

Method

Participants

Two hundred and ninety-nine participants were recruited into the experiment. Participants were 51% female (n=150). Fifty-eight were removed for failing an attention check leaving n=241 (122 female) for the final analytical sample and aged between 19 and 84 (M=43.26, SD = 14.16). A priori sample size calculation using G* power determined a sample size of 232 would be required to achieve 90% power to detect a medium (f=0.25) effect size, at a significance level of .05. To be eligible for inclusion, participants were required to be 18+ years, consume alcohol regularly (designated at least one occasion per week and at least 10 units on average. Participants must have also had normal or corrected to normal vision for the images. Participants were excluded if they had a previous or current diagnosis of alcohol use disorder. This study was granted ethical approval by the host university's ethics committee. Participants were recruited through the crowdsourcing platform prolific. Participants were compensated £1.50.

Materials

Concurrent choice task. Participants were presented with 48 two-alternative-forced choice trials in which they chose to enlarge and color grayscale thumbnail pictures (Hardy et al., 2018) of either alcohol (wine, cider, beer, whisky) or food (crisp, pizza, sausage roll, chocolate) by clicking on the image with their cursor. Presentation of images (left vs right) was randomized to prevent participants showing a preference for clicking one side of the screen. Instructions for the task were "In this task you can view alcohol and food pictures by clicking your mouse on the thumbnail image."

Alcohol-use disorder identification test (AUDIT) (Saunders et al., 1993). See Experiment 1 for details. The AUDIT has good internal reliability within sample 2 (α=.85).

*Visual analog scale (VAS) (**Hayes & Patterson, 1921**)*. The VAS had anchor points at −100 and 100. Participants were asked to rate how "appealing" the 8 food and alcohol images were on the scale by clicking their cursor at a point along the line.

Procedure

Once informed consent was given, participants completed the AUDIT, BIS-11 (including an attention check) and M-DMQ-R (reported in supplementary materials). After the initial questionnaires' participants were presented with 8 images in a sequence, 4 experimental manipulation images and 4 control filler images with each control image following a manipulation image and the order of initial presentation counterbalanced. The experimental images, depending on the condition were of people in a bar enjoying alcohol, people in a bar not enjoying alcohol, people at home enjoying alcohol and people at home not enjoying alcohol with each participant viewing 4 experimental images matching said condition (all images were initially tested using a pilot study to ensure both the location enjoyment were easily detectable by participants). The 4 filler images were of a car, a bike, a kettle, and a lamppost. Before the presentation, participants were told the images were for a memory test and after the 2nd filler image and the final manipulation image an attention check required participants to recall the color of an object in the previous image (e.g., "what color was the car?," "what color was the woman's cardigan?"). Following the image presentation, participants were presented with the CCT. Following the CCT, participants were then presented with the VAS.

Analysis strategy

The CCT was analyzed using a between subjects' ANOVA looking at the main effects of social influence (enjoyment vs non-enjoyment) and the main effects of context (bar vs home), as well as the interactions. AUDIT score was also correlated as with experiment 1 to look for any associations and if any of the associations were consistent across the experiments (presented in supplementary materials).

Results

CCT

A 2×2 between-subjects ANOVA was conducted to determine the effect of social influence and context on the

number of times alcohol was chosen over an alternative food reward in a concurrent choice task. There was no significant main effect of social influence on CCT alcohol choice (F (1,237) = 3.43, p = .065, ηp^2= .01, BF^{10} = 0.21). There was also no significant main effect of context (F (1,237) = .93, p = .335, ηp^2 = .00, BF^{10}= 0.14) and no significant interaction (F (1,237) = .08 p = .774, ηp^2 = .00, BF^{10}= 0.03 between social influence and context on CCT alcohol choice (Figure 2).

VAS

A 2×2 between-subjects ANOVA was conducted to determine the effect of social influence and context on the average VAS rating of alcohol images. There was no significant main effect of social influence on average alcohol VAS rating (F (1,235) = 2.46, p = .118, ηp^2 = .01, BF^{10}= 0.19). There was also no significant main effect of context (F (1,235) = .18., p = .676, ηp^2= .00, BF^{10} = 0.14) and no significant interaction (F (1,235) = .58, p = .449, ηp^2 = .00, BF^{10} = 0.03 (Figure 3).

Experiment 2 discussion

Using a novel task presenting images depicting distinct drinking scenarios, designed to elicit various "value inputs" identified in a recent VBDM model of self-control (Berkman et al., 2017), we aimed to investigate if the subjective value of alcohol could be manipulated when assessed using a CCT and a VAS. It was found that there were no differences between any conditions in value assessed by the CCT and VAS and no interaction. Therefore, the hypotheses that there would be a main effect of social influence on value, a main effect of context on value, and an interaction between the main effects were not supported.

General discussion

The aim of these studies was to investigate the potential of the application of Berkman et al. (2017) VBDM model to alcohol use by determining if it is possible to manipulate the value of alcohol using identified value inputs. We demonstrated evidence in experiment 1 for the manipulation *via* hypothetical social situations, whereas the presentation of visual contexts in experiment 2 failed to find the same pattern of results.

The results from experiment 1 are consistent with the review by Hogarth and Field (2020) who found that a proxy for value of alcohol can be manipulated, and that dependence may be characterized by a greater valuation of drug compared to non-drug rewards (in this case, alcohol). The results also demonstrate the potential for further investigation by testing other value inputs that might influence the subjective value of alcohol. The findings from experiment 1 are also consistent with the context literature (Monk & Heim, 2013, 2014; Stanesby et al., 2019). In that situations, real or simulated, depicting typical drinking environments or drinking in a social group influences alcohol cognition. This suggests that increased positive outcome expectancies may reflect a greater alcohol value. Therefore, these two disparate literatures may be reconciled under a value-based decision framework. It is unclear with the current study however if this increased value drives actual consumption, which is where inconsistency lies within in the context literature (Monk et al., 2020; Stanesby et al., 2019). One possible explanation for the failure to find an effect in experiment 2 may be the association found between AUDIT scores and value in experiment 2 and previous literature (Hardy et al., 2021; Hogarth & Hardy, 2018). The Experiment 2 sample had both a lower AUDIT score, compared to those previously found in the community (Hardy et al., 2021), and low ascription of value to alcohol assessed by both the CCT and VAS across all conditions. It may also be related to a lack of saliency of the images depicting drinking scenarios compared to participants reading hypothetical situations and being asked to imagine themselves in that situation. Interestingly experiment 1, despite finding an effect of the manipulation on alcohol value, failed to find an association between value and AUDIT which is inconsistent with both experiment 2 and previous work (Hardy et al., 2021; Hogarth

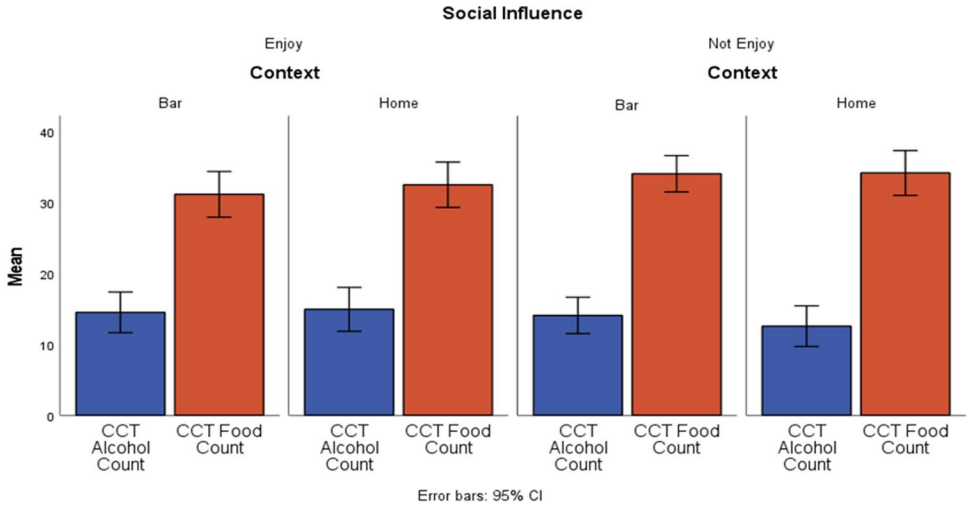

Figure 2. Shows no difference between conditions for number of times alcohol was chosen in the concurrent choice task and a much higher amount of times food was chosen over alcohol.

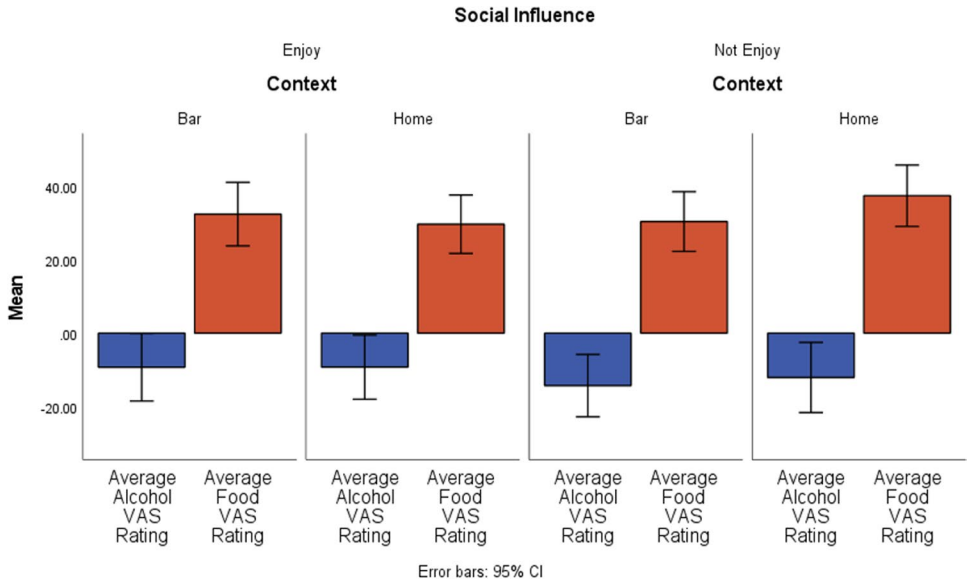

Figure 3. Shows no significant difference between conditions for alcohol VAS rating and a much higher VAS rating for food items.

& Hardy, 2018). This might be explained by the AUDIT scores in experiment 1 ($M = 20.25$ SD = 4.97) being much higher compared to experiment 2 ($M = 9.18$, SD = 6.30) and previous literature ($M = 13.10$, SD = 6.97) (Hardy et al., 2021), as well as 100% of the sample being classified as at-risk drinkers. Future research should aim to recruit a more heterogeneous sample (greater variation in AUDIT scores) than the current sample. It would also be noteworthy when using a larger sample to investigate if AUDIT score moderated any effect in a larger sample which maybe a possible cause of the current inconsistent evidence between experiment 1 and 2.

While this research has provided initial support for the application of Berkman et al. (2017) model to alcohol use and the emerging evidence base for context as a predictor of consumption (Monk & Heim, 2014), there are some limitations. For experiment 1, several issues have been identified with the BAAD as reported in Hardy et al. (2021). For example, as with any self-report measure the level to which participants can accurately introspect is unclear. This is particularly limiting with Breakpoint as it has been shown that actual behavior toward drug-use under rising costs is inconsistent with reported behavioral intentions (Bickel et al., 2014). Breakpoint is also limited in that is found to be influenced by levels of disposable income (Hardy et al., 2021) which in the current study was not assessed. Furthermore, the range of possible values is capped, potentially limiting participant responses, however across all conditions, even "Friends Drinking" which had the greatest values across each index, there appears to be no evidence of a ceiling effect. Furthermore, no baseline level of alcohol value was taken, therefore while we know certain conditions have a greater relative value compared to others, what we are unable to claim with certainty is the direction of the effect of the condition on alcohol's subjective value. For example, did the "Alone" condition lower the value compared to "Friends Drinking" or did both conditions higher the relative value compared to "Friends Drinking/Health Related" and further research should include a baseline to establish direction. Additionally, it is difficult to determine the exact value inputs at play as while the "Friends Drinking" and "Friends Not Drinking" conditions are conceptually opposed, the "Alone" condition may be an entire absence of social influence upon the alcohol value, but it also may tap into other value inputs as with the "Friends Drinking/Health Related" condition.

Concerning experiment 2 there were high levels of careless responding, $n = 57$ failed the attention checks during the image presentation. This issue potentially stems from the use of crowdsourcing as participants are paid "workers" and therefore have no intrinsic motivation to complete the research outside of gaining compensation (Jones et al., 2022).

From the limitations there have been opportunities for further research identified. To address the lack of identified direction of the manipulation of value by the inputs in experiment 1 and to address the lack of apparent saliency in the value manipulations of experiment 2, future research should aim to adopt lab-based experiments with greater control. Moreover, attaining a baseline value and personal appeal for alcohol and for the non-drug alternative as if the non-drug alternative has a much greater baseline value, there may be difficulty in altering alcohol's value enough to find any effects. Moreover, once value inputs have been identified in the lab it would also be imperative to determine if the same value inputs are identifiable in a real-world context and if they have translational value.

In conclusion, in experiment 1 we demonstrated the potential for the application of Berkman et al. (2017) model to alcohol use by manipulating the value of alcohol using value inputs, however the findings in experiment 2 were inconsistent which is likely explained by the greater saliency of manipulation in experiment 1 with participants being asked to imagine themselves in the hypothetical situation as opposed to being presented with images depicting said scenario. Moreover, the inconsistency may be explained by the association between AUDIT score and relative ascription

of value to alcohol and the low AUDIT score found within sample 2. This research demonstrates the potential for the application of models of Value-Based Decision Making to predicting alcohol-use and related problems, which may then inform effective interventions to reduce alcohol harm.

Declaration of interest

The authors declare that they have no conflict of interest. The authors alone are responsible for the content and writing of the article.

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ORCID

Jack Yates http://orcid.org/0000-0001-8455-9394

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