THE RELATIVE CONTRIBUTION OF METACOGNITIVE BELIEFS AND EXPECTANCIES TO DRINKING BEHAVIOUR

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Abstract — Aims: Alcohol expectancies refer to the effects of alcohol use anticipated by an individual. Metacognitive beliefs about alcohol use are a specific form of alcohol expectancy relating to the beliefs individuals hold about the effects of alcohol on cognition and emotion. Method: A community sample of 355 individuals completed measures of alcohol expectancies, metacognitive beliefs about alcohol use, and drinking behaviour. Results: Correlation analyses indicated that alcohol expectancies and metacognitive beliefs about alcohol use were positively correlated with drinking behaviour. Structural regression modelling revealed that four facets of metacognitive beliefs about alcohol use were independent contributors to drinking behaviour, and that, when controlling for such beliefs, only negative social performance alcohol expectancies explained additional variance in drinking behaviour. Conclusions: These results add to the argument that there is a value in differentiating between metacognitive beliefs about alcohol use and alcohol expectancies in predicting drinking behaviour.

INTRODUCTION

Expectancies refer to a person’s evaluation of an anticipated outcome (Tollman, 1932). This evaluation is understood to be primarily of an ‘if-then’ nature; if a certain event is presented, then a certain event is expected to follow (Bolles, 1972). Alcohol expectancies, therefore, refer to an individual’s explicit or implicit set of beliefs about the effects of drinking alcohol (Brown, 1985; Brown et al., 1987). Alcohol expectancies are believed to reflect memories arising from various forms of learning (Del Boca et al., 2002). According to Social Learning Theory (e.g. Maisto et al., 1999) and Outcome Expectancy models (e.g. Jones et al., 2001) information about the link between drinking behaviours and specific outcomes is learned. The concept of alcohol expectancies thus provides a theoretical framework for understanding a person’s motivation to drink and can help explain problematic drinking behaviour.

The construct of alcohol expectancies is multidimensional, and includes both positive and negative effects of alcohol use (Leigh and Stacy, 1993). Positive alcohol expectancies (e.g. ‘Drinking will make me relax’) refer to the drinker’s perception of the positive outcomes of drinking, and have been shown to be associated to alcohol consumption (Christiansen et al., 1989; Darkses and Goldman, 1993; Dunn and Goldman, 1996; Goldman et al., 1999). Negative alcohol expectancies (e.g. ‘When I drink I have problems driving’) refer to the expected negative outcomes that occur as a result of drinking and have been found, overall, to be less reliably associated to alcohol use (Christiansen et al., 1989; Stacy et al., 1990; McNally and Palfai, 1990). Indeed some studies have found this construct to be associated with lower levels of alcohol use (Leigh, 1989; Weirs et al., 1997; Kilbey et al., 1998; Sharkansky and Finn, 1998), and a lower probability for relapse after treatment (Eastman and Norris, 1982; Jones and McMahon, 1994), while other studies have reported a positive association with heavy drinking (Mann et al., 1987; McMahon et al., 1994) or no association to alcohol use (Southwick et al., 1981; Fromme et al., 1993).

The emergence of cognitive theories of psychopathology (e.g. Beck, 1976) has led to a growing interest in the characteristics of cognition and its regulation. One particular line of theoretical work has emphasized the role of metacognitive beliefs as central to the development and persistence of dysfunction (Wells, 2000). Metacognitive beliefs refer to the information individuals hold about their own cognition and internal states, and about coping strategies that impact on both (Brown, 1987; Wells and Matthews, 1994, 1996; Wells, 2000). Examples of information individuals hold about their own cognition and internal states may include beliefs concerning the significance of particular types of thoughts, e.g. ‘It is bad to think thought X’ or ‘I need to control thought X’. Examples of information individuals hold about coping strategies that impact on cognition and internal states may include beliefs such as ‘Smoking will help me get things sorted out in my mind’ or ‘Worrying will help me solve the problem’. According to the metacognitive theoretical tenet (Wells and Matthews, 1994, 1996; Wells, 2000) these beliefs are fundamental in predisposing individuals to develop response patterns to thoughts and internal events that are characterized by heightened self-focused attention, recyclical thinking patterns, avoidance and thought suppression, threat monitoring and maladaptive behaviour. Research evidence appears to support this contention, as metacognitive beliefs have been implicated in a variety of psychological problems including depression (Papageorgiou and Wells, 2003), generalized anxiety disorder (Cartwright-Hatton and Wells, 1997; Wells and Carter, 2001), hypochondriasis (Bourman and Meijer, 1999), obsessive-compulsive disorder (Emmelkamp and Aardema, 1999), post-traumatic stress disorder (Reynolds and Wells, 1999), procrastination (Spada et al., 2006a), psychosis...
cies and metacognitive beliefs about alcohol use to drinking knowledge of the relative contribution of alcohol expectancies and metacognitive beliefs about alcohol use can be conceptualized as a specific form of expectancy relating to the use of alcohol as a means of controlling and regulating cognition and emotion. Examples of positive metacognitive beliefs about alcohol use may include: ‘Drinking makes me think more clearly’ (problem-solving), ‘Drinking helps me to control my thoughts’ (thought control), ‘Drinking helps me focus my mind’ (attention regulation), ‘Drinking reduces my self-consciousness’ (self-image control), ‘Drinking reduces my anxious feelings’ (emotion regulation). From a metacognitive standpoint such beliefs are thought to play a central role in motivating individuals to engage in alcohol use as a means of cognitive-emotional regulation (Spada and Wells, 2006a).

A key difference between positive alcohol expectancies and positive metacognitive beliefs about alcohol use is that the former do not explicitly distinguish between cognitive and metacognitive belief domains. Indeed, in existing positive alcohol expectancies measures some items appear to tap into the social-cognitive domain (e.g. ‘Drinking will make me have a good time’; ‘Drinking will give me pleasant physical effects’; ‘Drinking will make me more outgoing’) while others appear to tap into the metacognitive domain (e.g. ‘Drinking will take away my negative mood and feelings’; ‘Drinking allows me to take my mind off problems’). Furthermore, none of the current positive alcohol expectancies measures clearly identify beliefs concerning the usefulness of alcohol as a cognitive control and self-regulation tool (i.e. specific beliefs regarding problem-solving, thought control, attention regulation, and self-image control arising from alcohol use).

Negative metacognitive beliefs about alcohol use concern the perception of lack of executive control over alcohol use (e.g. ‘My drinking persists no matter how I try to control it’), and the judgement of the negative impact of alcohol use on cognitive functioning (e.g. ‘Drinking will damage my mind’). From a metacognitive standpoint, such beliefs are thought to play a crucial role in the perpetuation of alcohol use (Spada and Wells, 2006a) by becoming activated during, and following a drinking episode, and triggering negative emotional states that compel a person to drink more. Negative alcohol expectancies differ from such beliefs inasmuch as they mainly measure general negative outcomes arising from alcohol use (e.g. ‘I get a hangover’; ‘I feel guilty’). Therefore, there is some overlap between metacognitive beliefs about alcohol use and alcohol expectancies but this is limited to beliefs regarding the effects of alcohol on emotional self-regulation.

In view of the potential role of metacognitive beliefs in drinking behaviour, and the metacognitive theoretical tenet (Wells and Matthews, 1994, 1996; Wells, 2000) that such beliefs should contribute significantly to psychopathology, additional research is required that may contribute to our knowledge of the relative contribution of alcohol expectancies and metacognitive beliefs about alcohol use to drinking behaviour. In this paper, we report a study aimed at comparing the two constructs. We hypothesized that positive and negative metacognitive beliefs about alcohol use would explain additional variance in drinking behaviour when compared to alcohol expectancies.

**METHOD**

**Participants**

A community sample of 355 individuals (211 females and 142 males) participated in the study. Two hundred and forty participants were undergraduate students from London universities, and 115 were professionals. The professionals were primarily university and health services employees. For purposes of inclusion in this study the participants were required to speak English and to be at least 18 years of age. The mean age and standard deviation (SD) for the total sample were 28.8 and 9.6 years respectively (age range 18–64 years). Of the total sample, 75% were white, 12% were black, 10% were from Indian, Chinese or other Asian origins, and the remaining 3% were from mixed ethnic background. The sample was largely middle-class. The participants reported drinking a mean number of 28.9 units per week (SD = 28.7). Their mean score on the Alcohol Use Disorders Identification Test (AUDIT) was 9.3 (SD = 6.4) indicating moderate problem drinking behaviour.

**Measures**

The following measures were used:

**The Alcohol Outcome Expectancies Scale (AOES).** AOES is a 34-item measure developed to assess alcohol expectancies (Leigh and Stacy, 1993). It was designed to address limitations of previous alcohol expectancies measures (Leigh and Stacy, 1993). AOES measures positive and negative alcohol expectancies and consists of two factors, positive and negative alcohol effects. Each factor has four sub-categories; the positive factor includes: social facilitation, fun, sex, and tension reduction. The negative factor includes: social performance, emotions, physical, and cognitive performance. The measure is scored using a 6-point likelihood scale with the end points of ‘no chance’ to ‘certain to happen’. Participants are asked to rate how likely the consequences listed are to take place if they drank alcohol. AOES possesses good test-retest reliability, discriminant and convergent validity (Leigh and Stacy, 1993).

**The Positive Alcohol Metacognitions Scale (PAMS).** PAMS is a 12-item measure developed to assess positive metacognitive beliefs about alcohol use (Spada and Wells, 2006b). It consists of two factors: (i) positive metacognitive beliefs about emotional self-regulation; and (ii) positive metacognitive beliefs about cognitive self-regulation. Examples of items relating to emotional self-regulation include: ‘Drinking makes me feel more relaxed’, ‘Drinking reduces my anxious feelings’, and ‘Drinking reduces my self-consciousness’. Examples of items relating to cognitive self-regulation include: ‘Drinking helps me think more clearly’, ‘Drinking helps me to control my thoughts’, and ‘Drinking helps me to control my thoughts’.
me focus my mind’. The measure is scored using a four-point likelihood scale with the end points of ‘do not agree’ to ‘agree very much’. Participants are asked to rate how much they agree with the statements listed.

The original item pool for PAMS was gathered from a semi-structured interview with problem drinkers (Spada and Wells, 2006a) and transcripts of cognitive therapy conducted with outpatients. PAMS was initially constructed and factor-analysed in a community sample (N = 261) and its factor structure was replicated in a clinical sample (N = 80) (Spada and Wells, 2006b). Results from these studies suggest that PAMS is dimensional and possesses good internal reliability in both community (α = 0.88 for PAMS total, α = 0.81 for factor 1, and α = 0.87 for factor 2) and clinical (α = 0.84 for PAMS total, α = 0.77 for factor 1, and α = 0.81 for factor 2) populations (Spada and Wells, 2006b). Mean PAMS scores at testing and retesting over an 8-week period in a community populations (Spada and Wells, 2006b). Results from these studies suggest that PAMS is dimensional and possesses good inter-nal reliability in both community (α = 0.88 for PAMS total, α = 0.81 for factor 1, and α = 0.87 for factor 2) and clinical (α = 0.84 for PAMS total, α = 0.77 for factor 1, and α = 0.81 for factor 2) populations (Spada and Wells, 2006b). Mean PAMS scores at testing and retesting over an 8-week period in a community population (N = 138) (Spada and Wells, 2006b). NAMS factor 1 has been found to predict problem drinking independently of trait anxiety in a community population (N = 80) (Spada and Wells, 2006b). NAMS factor 1 has been found to predict problem drinking independently of anxiety and depression in a clinical population (N = 80) (Spada and Wells, 2006b).

The Negative Alcohol Metacognitions Scale (NAMS). NAMS is a 6-item measure developed to assess negative metacognitive beliefs about alcohol use (Spada and Wells, 2006b). It consists of two factors: (i) negative metacognitive beliefs about uncontrollability; and (ii) negative metacognitive beliefs about cognitive harm. Items relating to uncontrollability include: ‘I have no control over my drinking’, ‘My drinking persists no matter how hard I try to control it’, and ‘Drinking controls my life’. Items relating to cognitive harm include: ‘If I cannot control my drinking I will cease to function’, ‘Drinking will damage my mind’, and ‘Drinking will make me lose control’. The measure is scored using a 4-point like-lihood scale with the end points of ‘do not agree’ to ‘agree very much’. Participants are asked to rate how much they agree with the statements listed.

The original item pool for NAMS was gathered from a semi-structured interview with problem drinkers (Spada and Wells, 2006a) and transcripts of cognitive therapy conducted with outpatients. NAMS was initially constructed and factor-analysed in a community sample (N = 261) and its factor structure was replicated in a clinical sample (N = 80) (Spada and Wells, 2006b). Results from these studies suggest that NAMS is dimensional and possesses good internal reliability in both community (α = 0.74 for NAMS total, α = 0.85 for factor 1, and α = 0.72 for factor 2) and clinical (α = 0.87 for PAMS total, α = 0.87 for factor 1, and α = 0.83 for factor 2) populations (Spada and Wells, 2006b). Mean NAMS scores at testing and retesting over an 8-week period in a community sample (N = 50) indicate acceptable test-retest reliability for factor 2, but poor test-retest reliability for factor 1 (factor 1: rho = 0.42, P = 0.001; factor 2: rho = 0.68, P < 0.0005) (Spada and Wells, 2006b). NAMS factor 1 has been found to predict problem drinking independently of trait anxiety in a community population (N = 138) (Spada and Wells, 2006b). NAMS factor 1 has been found to predict problem drinking independently of anxiety and depression in a clinical population (N = 80) (Spada and Wells, 2006b). NAMS factor 1 has been found to predict classification as a problem drinker independently of emotion in a mixed community and clinical population (N = 163) (Spada and Wells, 2006b).

The Quantity Frequency Scale (QFS). QFS is a measure of alcohol consumption levels, with items assessing the dimensions of quantity and frequency of alcohol beverages consumed over a period of 30 days (Cahalan et al., 1969). This measure consists of three questions (‘have you been drinking any beer/wine/spirits over the last 30 days?’, ‘about how often do you consume beer/wine/spirits?’; and ‘about how much beer/wine/spirits did you drink on a typical day when you drink beer/wine/spirits?’). These are repeated for each of the major alcohol beverage categories (beer, wine and distilled spirits). The total scores from the different alcohol beverage categories are then added together and an estimated daily (or weekly) level of alcohol consumption can be computed. This instrument has been extensively used and possesses good validity and reliability (Hester and Miller, 1995).

The Alcohol Use Disorders Identification Test (AUDIT). AUDIT was developed as a screening tool by the World Health Organisation (WHO) for early identification of problem drinkers (Babor et al., 1992). AUDIT consists of ten questions regarding recent alcohol consumption, alcohol dependence symptoms and alcohol-related problems. Respondents are asked to choose one out of a maximum of five statements: (per question) that most applies to their use of alcohol beverages over the past year. Responses are scored from zero to four in the direction of problem drinking. The summary score for the total AUDIT ranges from zero, indicating no presence of problem drinking behaviour, to 40 indicating marked levels of problem drinking behaviour and alcohol dependence. The threshold for indicating possible problem drinking pathology is a score of eight. This instrument has been extensively used and possesses good validity and reliability (Hester and Miller, 1995).

Procedure
Participants were informed that all data provided in the questionnaires would be treated with the strictest confidence and that participation in the research project was entirely voluntary (i.e. they could withdraw at any time if they so wished). Instructions for completing the questionnaires were given verbally and in writing. Participants completed the AOES, PAMS, NAMS, QFS and AUDIT measures on one occasion.

Results
Data description
Descriptive statistics for all study variables are shown in Table 1. Cronbach’s alpha coefficients for problem drinking, all positive alcohol expectancies (social facilitation, fun,
sex, and tension reduction), all negative alcohol expectancies (social performance, emotions, physical, and cognitive performance) and positive metacognitive beliefs about alcohol use (emotional and cognitive self-regulation) exceeded 0.70 and were thus satisfactory. The Cronbach’s alpha coefficients for negative metacognitive beliefs about alcohol use (uncontrollability and cognitive harm) were lower (0.61 and 0.64, respectively) but still acceptable in consideration of the small number of items contributing to the measures’ scores.

An inspection of histograms and skewness coefficients showed that several measures were positively skewed. Since we aimed to run structural regression modelling we transformed these measures using a square-root transformation (Tabachnick and Fidell, 1996). This was successful in achieving normality for all measures.

Two-tailed Pearson Product-Moment correlations showed that problem drinking was positively correlated with alcohol use as evidenced in the literature. All alcohol expectancies were positively correlated with one another, as found in previous validation studies. All metacognitive beliefs about alcohol use had low to moderate positive correlations with one another (with the exception of positive metacognitive beliefs about cognitive harm which were uncorrelated) as found in the preliminary validation studies of these measures (Spada and Wells, 2006b). In all, these patterns of correlations support the convergent validity of the measures of drinking behaviour, alcohol expectancies, and metacognitive beliefs about alcohol use.

All alcohol expectancies and all metacognitive beliefs about alcohol use were positively correlated with both measures of drinking behaviour. Moreover, with the exception of negative metacognitive beliefs about cognitive harm, which were uncorrelated with fun and sex alcohol expectancies, and positive metacognitive beliefs about emotional self-regulation which were uncorrelated with physical alcohol expectancies, alcohol expectancies and metacognitive beliefs about alcohol use were positively correlated with one another. These findings indicate the need of adopting structural regression modelling in order to disentangle the contributions of each construct.

**Structural regression modelling**

The relative contribution of alcohol expectancies and metacognitive beliefs about alcohol use to drinking behaviour was

<table>
<thead>
<tr>
<th>Variables</th>
<th>X</th>
<th>SD</th>
<th>Alpha</th>
<th>1</th>
<th>2</th>
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<th>12</th>
<th>13</th>
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<tbody>
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<td>Drinking behaviour</td>
<td>1</td>
<td><strong>Problem drinking</strong> (AUDIT)</td>
<td>9.27</td>
<td>6.39</td>
<td>0.91</td>
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<td>2</td>
<td><strong>Alcohol use</strong> (QFS)</td>
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<td>0.79**</td>
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<td>Alcohol outcome expectancies</td>
<td>3</td>
<td><strong>Positive social facilitation</strong> (AOEQ1)</td>
<td>22.60</td>
<td>7.02</td>
<td>0.89</td>
<td>0.46**</td>
<td>0.34**</td>
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<td>4</td>
<td><strong>Positive fun</strong> (AOEQ2)</td>
<td>23.50</td>
<td>6.73</td>
<td>0.86</td>
<td>0.42**</td>
<td>0.36**</td>
<td>0.76**</td>
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<td><strong>Positive sex</strong> (AOEQ3)</td>
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<td>5.58</td>
<td>0.90</td>
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<td>0.62**</td>
<td>0.54**</td>
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<td>6</td>
<td><strong>Positive tension reduction</strong> (AOEQ4)</td>
<td>10.55</td>
<td>3.51</td>
<td>0.80</td>
<td>0.44**</td>
<td>0.34**</td>
<td>0.72**</td>
<td>0.68**</td>
<td>0.51**</td>
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<tr>
<td>7</td>
<td><strong>Negative social performance</strong> (AOEQ5)</td>
<td>6.09</td>
<td>3.66</td>
<td>0.89</td>
<td>0.55**</td>
<td>0.49**</td>
<td>0.43**</td>
<td>0.40**</td>
<td>0.43**</td>
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<td>8</td>
<td><strong>Negative emotions</strong> (AOEQ6)</td>
<td>6.25</td>
<td>2.93</td>
<td>0.80</td>
<td>0.40**</td>
<td>0.33**</td>
<td>0.32**</td>
<td>0.14**</td>
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<td>0.56**</td>
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<td>9</td>
<td><strong>Negative physical performance</strong> (AOEQ7)</td>
<td>13.10</td>
<td>4.42</td>
<td>0.72</td>
<td>0.19**</td>
<td>0.15**</td>
<td>0.28**</td>
<td>0.18**</td>
<td>0.16**</td>
<td>0.24**</td>
<td>0.35**</td>
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<td>10</td>
<td><strong>Negative cognitive performance</strong> (AOEQ8)</td>
<td>18.19</td>
<td>6.20</td>
<td>0.70</td>
<td>0.31**</td>
<td>0.27**</td>
<td>0.50**</td>
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<td>Metacognitive beliefs</td>
<td>11</td>
<td><strong>Positive emotional self-regulation</strong> (PAMS1)</td>
<td>17.93</td>
<td>5.47</td>
<td>0.80</td>
<td>0.39**</td>
<td>0.27**</td>
<td>0.64**</td>
<td>0.53**</td>
<td>0.46**</td>
<td>0.51**</td>
<td>0.26**</td>
<td>0.17**</td>
<td>0.09</td>
<td>0.23**</td>
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<tr>
<td>12</td>
<td><strong>Positive cognitive self-regulation</strong> (PAMS2)</td>
<td>7.83</td>
<td>3.49</td>
<td>0.82</td>
<td>0.50**</td>
<td>0.43**</td>
<td>0.49**</td>
<td>0.41**</td>
<td>0.47**</td>
<td>0.45**</td>
<td>0.33**</td>
<td>0.30**</td>
<td>0.21**</td>
<td>0.24**</td>
<td>0.31**</td>
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<tr>
<td>13</td>
<td><strong>Negative uncontrollability</strong> (NAMS1)</td>
<td>4.10</td>
<td>1.70</td>
<td>0.61</td>
<td>0.51**</td>
<td>0.46**</td>
<td>0.26**</td>
<td>0.20**</td>
<td>0.28**</td>
<td>0.28**</td>
<td>0.34**</td>
<td>0.35**</td>
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<td>0.23**</td>
<td>0.15**</td>
<td>0.43**</td>
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<tr>
<td>14</td>
<td><strong>Negative cognitive harm</strong> (NAMS2)</td>
<td>4.77</td>
<td>2.18</td>
<td>0.64</td>
<td>0.30**</td>
<td>0.27**</td>
<td>0.15**</td>
<td>0.06</td>
<td>0.08</td>
<td>0.15**</td>
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<td>0.32**</td>
<td>0.23**</td>
<td>0.24**</td>
<td>0.21**</td>
<td>0.04</td>
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Note: *N* = 355.

*  *P* < 0.05

**  *P* < 0.01
alcohol use significantly predicted drinking behaviour. AUDIT refers to the Alcohol Use Disorders Identification Test. QFS refers to the Quantity Frequency Scale. AOEQ refers to alcohol expectancies, with the following facets: (1) positive social facilitation, (2) positive fun, (3) positive sex, (4) positive tension reduction, (5) negative social performance, (6) negative emotions, (7) negative physical, and (8) negative cognitive performance. PAMS1 refers to positive metacognitive beliefs about alcohol use (PAMS factors 1 and 2), and NAMS2 refers to negative metacognitive beliefs about cognitive self-regulation. NAMS1 refers to negative metacognitive beliefs about uncontrollability. NAMS2 refers to negative metacognitive beliefs about cognitive harm. * P < 0.05; ** P < 0.01.

Fig. 1. Structural regression models of drinking behaviour, defined as a latent dependent variable indirectly measured by AUDIT and QFS, on: (a) positive alcohol expectancies (AOEQ 1–4) and negative alcohol expectancies (AOEQ 5–8); and (b) metacognitive beliefs about alcohol use (PAMS1, PAMS2, NAMS1, and NAMS2). Both sets of variables are defined as directly measurable predictors.

Note: N = 355. The figure shows the standardized path coefficients and their significance levels for each of the two separate models, indicating that: (1) the positive social performance facet of alcohol expectancies significantly predicted drinking behaviour; and (2) all four facets of metacognitive beliefs about alcohol use significantly predicted drinking behaviour. AUDIT refers to the Alcohol Use Disorders Identification Test. QFS refers to the Quantity Frequency Scale. AOEQ refers to alcohol expectancies, with the following facets: (1) positive social facilitation, (2) positive fun, (3) positive sex, (4) positive tension reduction, (5) negative social performance, (6) negative emotions, (7) negative physical, and (8) negative cognitive performance. PAMS1 refers to positive metacognitive beliefs about emotional self-regulation. PAMS2 refers to positive metacognitive beliefs about cognitive self-regulation. NAMS1 refers to negative metacognitive beliefs about uncontrollability. NAMS2 refers to negative metacognitive beliefs about cognitive harm. * P < 0.05; ** P < 0.01.

examine using structural regression modelling (e.g. Kline, 1998). Drinking behaviour was defined as a latent dependent variable that is indirectly measured by AUDIT and QFS. All alcohol expectancies and metacognitive beliefs about alcohol use were defined as directly measurable predictors of drinking behaviour. The goodness-of-fit of the models was assessed by the chi-square, comparative fit index (CFI), and root mean square error of approximation (RMSEA). The chi-square tests the overall fit of the model to the data. Strictly, a model fits if the chi-square is non-significant, provided that there is enough statistical power. The CFI measures how well the model fits compared to a null model. This index ranges from 0–1, with a value of 0.95 or higher, indicating satisfactory fit (Hu and Bentler, 1999). The RMSEA is a measure of discrepancy between the model and the data adjusted for degrees of freedom. This index ranges from 0–1, with a value below 0.05 indicating good fit (Hu and Bentler, 1999). All models were estimated using the software LISREL 8.8 (Jöreskog and Sörbom, 1996).

In the first model, drinking behaviour was regressed only on the eight alcohol expectancies. The fit of the model was satisfactory (chi-square = 6.07, df = 7, P = 0.53, CFI = 1.00, RMSEA = 0.00). The model accounted for 40% of the variance in drinking behaviour. Figure 1(a) shows the path diagram with the estimated standardized path coefficients. Negative social performance alcohol expectancies were the only significant predictor of drinking behaviour. In all, the model confirms that alcohol expectancies are contributors to drinking behaviour, but suggests that the eight measures of this construct might excessively overlap with one another.

In the second model, drinking behaviour was regressed only on the four metacognitive beliefs about alcohol use. The fit of the model was almost identical to that of the previous model (chi-square = 2.69, df = 3, P = 0.44, CFI = 1.00, RMSEA = 0.00). The model accounted for 43% of the variance in drinking behaviour. Figure 1(b) shows the path diagram with the estimated standardized path coefficients. All metacognitive beliefs about alcohol use were significant predictors of drinking behaviour. In all, the model suggests that the measures of this construct are sufficiently distinct from one another, and each one of them is an independent contributor to drinking behaviour.

In the third model, drinking behaviour was regressed on both alcohol expectancies and metacognitive beliefs about alcohol use. The fit of the model was slightly better than that of the previous two models (chi-square = 8.24, df = 11, P = 0.69, CFI = 1.00, RMSEA = 0.00). The model accounted for 54% of the variance in drinking behaviour. Figure 2 shows the path diagram with the estimated standardized path coefficients. Three of the four metacognitive beliefs about alcohol use (PAMS factors 1 and 2, and NAMS factor 1) were significant predictors of drinking behaviour. Of the eight alcohol expectancies only negative social performance alcohol expectancies was a significant predictor of drinking behaviour. In all, the model corroborates
Fig. 2. Structural regression model of drinking behaviour, defined as a latent dependent variable indirectly measured by AUDIT and QFS, on positive alcohol expectancies (AOEQ 1–4), negative alcohol expectancies (AOEQ 5–8) and metacognitive beliefs about alcohol use (PAMS1, PAMS2, NAMS1, and NAMS2). Both sets of variables are defined as directly measurable predictors.

Note: $N = 355$. The figure shows the standardized path coefficients and their significance levels, indicating that three of the four facets of metacognitive beliefs about alcohol use (PAMS1 and 2, and NAMS1) and the negative social performance facet of alcohol expectancies significantly predicted drinking behaviour. AUDIT refers to the Alcohol Use Disorders Identification Test. QFS refers to the Quantity Frequency Scale. AOEQ refers to alcohol expectancies, with the following facets: (1) positive social facilitation, (2) positive fun, (3) positive sex, (4) positive tension reduction, (5) negative social performance, (6) negative emotions, (7) negative physical, and (8) negative cognitive performance. PAMS1 refers to positive metacognitive beliefs about emotional self-regulation. PAMS2 refers to positive metacognitive beliefs about cognitive self-regulation. NAMS1 refers to negative metacognitive beliefs about uncontrollability. NAMS2 refers to negative metacognitive beliefs about cognitive harm. * $P < 0.05$; ** $P < 0.01$.

that three metacognitive beliefs are an independent contributor to drinking behaviour, and suggests that, when controlling for metacognitive beliefs, only negative social performance alcohol expectancies explain additional variance in drinking behaviour.

DISCUSSION

The aim of the present study was to investigate the relative contribution of alcohol expectancies and metacognitive beliefs about alcohol use to drinking behaviour. Structural regression modelling revealed that three of the four metacognitive beliefs about alcohol use (positive metacognitive beliefs about emotional self-regulation, positive metacognitive beliefs about cognitive self-regulation, and negative metacognitive beliefs about uncontrollability) were independent contributors to drinking behaviour, and that, when controlling for such beliefs, only negative social performance alcohol expectancies explained additional variance in drinking behaviour. These results are consistent with our hypothesis that metacognitive beliefs about alcohol use account for individual differences in drinking behaviour over and above the construct of alcohol expectancies.

The present results add to a growing body of data that has demonstrated links between metacognition and drinking behaviour (Spada and Wells, 2005, 2006a,b; Spada et al., 2006b). The findings also indicate that alcohol expectancies and metacognitive beliefs about alcohol use as assessed by existing measures are, to a degree, distinct constructs, and that metacognitive beliefs about alcohol use play an important role in predicting drinking behaviour beyond that of alcohol expectancies. The key similarity between metacognitive beliefs about alcohol use and alcohol expectancies is that the positive dimensions of both constructs capture what are essentially motivations for alcohol use. A crucial difference, however, is that positive alcohol expectancies do not explicitly distinguish between cognitive and metacognitive belief domains. This is an important distinction, because, according to metacognitive theory, the key markers of psychopathology are beliefs pertaining to the metacognitive rather than cognitive domain (Wells, 2000). Furthermore, while there may be a partial overlap between the content of positive metacognitive beliefs about emotional self-regulation and some items in the positive alcohol expectancies scales, none of the current expectancy measures clearly identifies beliefs concerning the usefulness of alcohol as a cognitive self-regulation tool. With respect to the negative dimensions of both scales, whereas alcohol expectancies mainly measure general negative outcomes arising from alcohol use, metacognitive beliefs about alcohol use specifically tap into the perception of lack of executive control over alcohol use, and the impact of alcohol use as a coping strategy on cognitive functioning. The findings of this study highlight the importance of developing the measurement of beliefs about alcohol use into well-separated cognitive and metacognitive dimensions.

The findings of this study also suggest that Wells’ metacognitive framework (Wells, 2000) might be used to develop a conceptualization of maladaptive drinking behaviour. Such an
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approach may help further our understanding of cognitive factors involved in cause and maintenance of excessive alcohol use and complement social learning and outcome expectancy models. From a metacognitive standpoint, positive metacognitive beliefs about alcohol use motivate individuals to engage in alcohol use as a means to regulate internal states. During, and following a drinking episode, individuals appraise their alcohol use as both uncontrollable and dangerous through the activation of negative metacognitive beliefs. The activation of these beliefs, in turn, leads to an escalation in negative emotions, further locking the person into the vicious cycle of drinking.

In line with this metacognitive conceptualization of emotional dysfunction (Wells and Matthews, 1994, 1996), both positive and negative metacognitive beliefs about alcohol use were found to predict drinking behaviour. This suggests that believing that alcohol use is an effective strategy for controlling thoughts, reducing self-consciousness, solving problems, and managing emotion may be fundamental to the initiation of drinking behaviour. Conversely, during and following a drinking episode, the activation of beliefs regarding the lack of executive control over alcohol use may trigger negative emotional states that compel a person to drink more.

These results of this study also have a number of possible clinical implications. In terms of assessment, information could be gathered not only in relation to alcohol expectancies, but also to associated metacognitive beliefs about alcohol use. With respect to treatment, the modification of metacognitive beliefs about alcohol use (e.g. through cost-benefit analyses and/or verbal re-attribution) may supplant interventions aimed at restructuring alcohol expectancies. Finally, in case of relapse of problem drinking behaviour, it may be helpful to derive and illustrate the role of metacognitive beliefs about alcohol use in the given episode.

The present results are preliminary in nature and they must be considered with regard to design limitations. Social desirability, self-report biases, and poor recall may have contributed to errors in self-report measurements. A cross-sectional design was adopted and this may only be suggestive of a causal inference. Future studies should, therefore, employ longitudinal designs. Furthermore, the sample consisted largely of middle class university students, and potential confounders such as, socio-economic status and education were not controlled for. Thus, while the present findings can be generalized to drinking behaviour they will need to be verified by examining individuals from a wider age range and controlling for background variables. Most importantly, future research will have to ascertain whether metacognitive beliefs about alcohol use or alcohol expectancies are a better predictor of problem drinking in clinical samples.

Despite these limitations this study has demonstrated that there is a value in differentiating between metacognitive beliefs about alcohol use and alcohol expectancies.

REFERENCES


