

**Developing and testing an integrative model of binge drinking behaviour in a student
population**

Laura Bettney

Supervised by:

Dr Joanne Dickson

Dr Peter Taylor

Dr Mani Mehdikhani

Submitted in partial fulfilment of the Doctorate in Clinical Psychology, University of
Liverpool

Contents

1. Introductory chapter: Thesis overview	1
2. Chapter 1 (Literature Review)	
Binge drinking behaviour in university students: A narrative review	3
Introduction	4
Methodology	5
Nature and prevalence of BD	10
Theoretical perspectives on BD	11
Insecure attachment: Theoretical background	11
Research evidence for the link between insecure attachment and BD behaviour	13
Affect regulation and dispositional mindfulness (DM): Theoretical background	17
Research evidence for the link between DM and BD behaviour	20
Alcohol expectancies: Theoretical background	24
Research evidence for the link between alcohol expectancies and BD behaviour	28
Approach/avoidance motivations: Theoretical background	33
Research evidence for the link between approach/avoidance motivations and BD behaviour	37
Summary	40
Methodological considerations and directions for future research	42
Potential clinical relevance	43
Conclusion	45
References	46
3. Chapter 2 (Empirical manuscript)	
Developing and testing an integrative model of binge drinking behaviour in a student population	61
Abstract	62
Introduction	63

Method	67
Participants	67
Measures	68
Procedure	71
Analysis	72
Results	73
Descriptive Statistics	73
Correlations	74
SEM analysis	77
Indirect effects	81
Discussion	82
Methodological considerations	84
Future research and clinical implications	86
Conclusion	88
References	89

List of tables

Chapter 1 and 2

Table 1: Summary of key studies included in the review	6
Table 2: Descriptive Statistics	74
Table 3 Correlation Matrix of Study Variables	75
Table 4: Unstandardised indirect effects for the final model	82

List of figures

Chapter 2

Figure 1: Visual representation of the proposed relationships between the psychological processes of interest	67
Figure 2: Visual representation of the initial model	77
Figure 3: Graphical representation of the final model	80

List of appendices

Appendix A: Data preparation, screening and Structural Equation Modelling (SEM)

97

Introductory Chapter: Thesis Overview

Binge drinking (BD) is a pressing social and public health concern in the United Kingdom (UK), particularly among university students. This thesis aims to better understand the psychological processes that may maintain and exacerbate BD behaviour in student populations. To address this broad aim, the thesis comprises a literature review (Chapter 1), and an empirical manuscript (Chapter 2). The thesis also includes appendices, which contain additional information pertinent to the two main chapters.

Chapter 1

This chapter aims to review key psychological processes and how these processes relate to BD behaviour in university students. Past literature suggests that insecure adult attachment style, dispositional mindfulness, alcohol expectancies and motivational tendencies are key psychological processes which may underpin BD. First, to set the context for this narrative review, the nature and prevalence of BD behaviour in students is presented, along with the potential short-and long-term consequences of this pattern of drinking. This chapter then reviews the key psychological processes and relevant empirical research in relation to BD behaviour in students. To date, these respective bodies of literature have developed along relatively separate lines of enquiry. Therefore, after examining the relevant literature, the review attempts to identify areas where relationships between the key theoretical processes are empirically supported and where further research is warranted, to begin to draw together a more theoretically-coherent, integrated model of BD behaviour, which constitutes the focus of the empirical paper.

Chapter 2

Chapter 2 contains the empirical paper. The empirical paper proposes and tests a theoretically integrated model of BD behaviour in students, which incorporates the key psychological processes examined in the narrative review. Specifically, the study investigates whether insecure attachment styles may give rise to ineffective internal emotion regulation strategies, leaving people seeking out external means of managing their emotions, which may include alcohol use. It is hypothesised that a positive expectancy that alcohol may help with the regulation of emotions may also be accompanied by more positive alcohol expectancies generally, which may in turn give rise to strong approach motivational tendencies towards alcohol. Three hundred and twenty two university students completed an online study to assess drinking behaviour and the key study variables. The results indicate that a large proportion of the sample displayed drinking behaviour that could be described as BD. SEM analysis provided some support for a more integrated model of BD. The study extends our understanding of the psychological processes that may be involved in BD behaviour in students, and tentatively lends support to the idea that there may be a psychosocial pathway from insecure attachment styles through various cognitive and motivational processes to increased BD. A theoretically integrated understanding of the relationships between these key processes may allow interventions or harm-reduction strategies aimed at reducing BD and its potential consequences to be targeted carefully in the areas they are likely to be most successful. The results suggest that strategies aimed at weakening approach motivations, strengthening avoidance motivations and modifying positive alcohol expectancies towards alcohol may be particularly useful. The empirical paper is intended for publication and is written in the style required by the journal identified for submission (*Addiction Research and Theory*).

Chapter 1:

Binge drinking behaviour in university students: A narrative review

Word Count (excluding references): 10, 889

Introduction

Binge drinking (BD) is a pressing social concern in the United Kingdom (UK), particularly among university students (Berridge, Herring, & Thom, 2009; Francesconi & James, 2015). The term BD is used to describe a single drinking session which leads to intoxication and is generally measured as the consumption of five or more drinks in a row for men and four or more in a row for women (Wechsler, Dowdall, Davenport, & Rimm, 1995). This narrative review aimed to examine the key psychological theories and processes underlying recent research on BD behaviour in student populations. It begins with a brief outline of the methodology used, followed by a definition of BD and its prevalence in university students. The focus is on students because the prevalence of BD behaviour in this population tends to be high, and previous research has linked BD behaviour in young adulthood to future alcohol dependence (among other short- and long-term consequences; NHS Choices, 2011). An examination of the literature in this area suggested that a number of factors may be predictive of BD behaviour in students. The key contributing factors of BD explored by this review are adult attachment style, affect-regulation strategies (in particular, the ability to respond in a mindful way to internal and external experiences), alcohol expectancies, and motivational tendencies. Each of these psychological processes has a large body of existing literature examining its relationship to drinking behaviour, and these tend to be relatively discrete. Each of these processes is discussed in terms of the theoretical background underpinning them, an overview of the relevant empirical research, and finally the limitations of key pieces of research in each area. The discussion section draws together the information in each area and highlights areas where more research is warranted. The next section outlines the key methodological considerations common to each area and makes a case for the importance of trying to integrate these psychological processes in a theoretically-coherent model of BD. Finally, the potential

relevance of this review for clinical practice is discussed, in particular regarding the development of harm-reduction strategies and interventions designed to combat BD behaviour in non-clinical student samples, before any long-term consequences related to this pattern of drinking can occur.

Methodology

Given the broad range of psychological processes that may be important in explaining BD behaviour, a narrative review was utilised in order to provide an inclusive and thorough coverage of the information in each area. Scopus, AMED, and PsycINFO were searched for each identified psychological factor in turn and several searches were completed for relevant parts of the review. The search terms entered included the following: ‘Alcohol use OR binge drinking OR heavy episodic drinking AND students’. These terms were combined using an ‘AND’ Boolean operator with each of the following in turn: ‘alcohol expectancies OR alcohol expectations’, ‘mindfulness OR dispositional mindfulness’, ‘attachment OR attachment style’, and ‘approach motivation OR avoidance motivation’. Following this, a scan of the article abstracts was completed in order to assess whether the paper was relevant for inclusion in the review. The inclusion criteria were that papers needed to: 1) include university or college student populations; 2) be available in English in full in electronic or paper format; and 3) look directly at the relationship between the variable of interest and alcohol use or BD. Studies not meeting these criteria were excluded. Reference lists of all relevant articles found during the search were scanned for other useful articles (judged based on the criteria above). In total, 58 papers in relation to BD behaviour in students were identified (27 regarding alcohol expectancies, 12 regarding dispositional mindfulness, 11 regarding adult attachment, and eight regarding approach/avoidance motivations). See Table 1 below for a summary of the key studies reviewed.

Table 1: Summary of key studies included in the review.

	Sample	Definition of BD	Variable/s of interest	Key findings
Molnar, Sadava, DeCourville & Perrier, 2010	696 first year university students.	Four/five or more drinks on one occasion for women and men respectively.	Attachment style, drinking motives.	Attachment anxiety was related positively to coping and social facilitation motives for drinking, and, in turn, high-risk drinking; attachment avoidance was related positively to coping motives but negatively to social facilitation motives.
Doumas, Turrisi & Wright, 2006	249 first year university students.	No definition given.	Attachment style.	Attachment avoidance was positively related to high-risk drinking for student athletes, but negatively related to drinking levels in non-athletes.
LaBrie, Thompson, Ferraiolo, Garcia, Huchting & Shelesky, 2008	214 female first year university students.	Four or more drinks on one occasion (women only).	Attachment style/relational health and drinking motivations.	Women who had stronger relational health and higher social facilitation and coping motives for drinking consumed more alcohol.
Leigh & Neighbors, 2009	212 undergraduate students.	Four/five or more drinks on one occasion.	Dispositional mindfulness, alcohol expectancies.	A positive correlation was found between levels of mind/body awareness and alcohol consumption in men. Non-

				attachment to thoughts was related to less drinking in men. Beliefs about using alcohol for social enhancement or coping purposes mediated these relationships.
Fernandez, Wood, Stein & Rossi, 2010	316 university students.	Four/five or more drinks on one occasion.	Dispositional mindfulness (FFMQ).	Significant negative correlations were found between alcohol use and a person's ability to 'act with awareness' and 'describe' (or identify and label) their experiences.
Eisenlohr-Moul, Walsh, Charnigo, Lynam & Baer, 2012	296 university students.	No definition given.	Dispositional mindfulness (FFMQ).	Findings supported the hypothesis that students scoring higher on the ability to 'observe' their experiences would consume more alcohol, unless they were also able to be 'non-judging' and 'non-reactive' to these observed experiences.
Vinci, Peltier, Shah, Kinsaul, Waldo, McVay & Copeland, 2014	207 university students, defined as 'at-risk' drinkers.	More than five drinks on one occasion.	Dispositional mindfulness.	A mindfulness intervention increased scores on a mindfulness measure and reduced negative affect, but did not reduce the urge to drink.

Holt, Armeli, Tennen, Austad, Raskin, Fallahi <i>et al</i>, 2013	844 first year undergraduate students.	No definition given.	Alcohol expectancies and drinking motivations.	Discovered five 'classes' of drinkers. The class with the highest drinking levels expected drinking to result in positive outcomes, reported lower levels of social support, greater levels of negative affect, and higher levels of social enhancement and coping motivations.
Bitarello do Amaral, Lourenco & Ronzani, 2006	255 university students.	No definition given.	Alcohol expectancies.	Endorsement of positive alcohol expectancies was linked to higher levels of alcohol consumption in both first- and final-year students.
Zamboanga, Horton, Leitkowski & Wang, 2006	85 female university students.	No definition of BD given, though >8 on the AUDIT indicated hazardous drinking.	Alcohol expectancies.	Positive alcohol expectancies predicted increased likelihood of hazardous drinking at baseline, and one year later after baseline drinking levels were accounted for.
McEvoy, Stritzke, French, Lang & Ketterman, 2004	589 Australian university students (study 1), 523 American university	No definition given, although participants were asked to indicate the number of standard drinks they consumed	Explicit approach/avoidance motivations (AAAQ).	Scores on the AAAQ subscales predicted different drinking patterns. Non-drinkers scored significantly higher on avoidance inclinations, and drinkers scored

	students (study 2).	per drinking occasion.		lower on avoidance inclinations than on mild approach inclinations, and this difference increased at riskier levels of drinking.
Ostafin, Palfai & Wechsler, 2003	61 undergraduate students.	4/5 or more drinks on one occasion.	Implicit approach/avoidance motivations.	College students with problematic drinking patterns displayed weak associations between alcohol-related cues and avoidance motivation. Lower implicit avoidance motivation was related to more frequent BD behaviour and more alcohol-related consequences.
O'Connor & Colder, 2005	533 first-year undergraduate students.	No definition given.	Explicit approach/avoidance motivations, alcohol expectancies and drinking motivations.	Approach motivations predicted heavy occasional drinking or very heavy occasional drinking. Weak avoidance motivations were not predictive of drinking patterns in this sample.

Nature and prevalence of BD

Historically, there has been a lack of consensus on how many drinks constitutes BD and so a variety of 'cut-offs' have been used in research. For example, some descriptions state that a binge is a pattern of drinking that brings blood alcohol content to .08g or above, while others state that a binge is more than six or eight units on one occasion in the past week for women and men respectively (Courtney & Polich, 2009). The majority of research on BD behaviour has been conducted in the United States, where the definition generally used is drinking five or more drinks in a row for men and four or more in a row for women. This is thought of as the threshold at which people are susceptible to alcohol-related social consequences (Wechsler *et al*, 1995). Men and women with a drinking pattern fitting this description consume above the UK government recommendations for safe alcohol intake of no more than three-four units of alcohol for men on any day and no more than two-three units of alcohol for women on any day (Department of Health, 2013).

This pattern of drinking is common among young adults (those aged 25 years or below; NHS Choices, 2011), including university students (Gill, 2002). In a study of seven UK universities, 65% of female and 76% of male students were found to report BD in the previous two weeks (El Ansari, Sebena, & Stock, 2013). BD has been associated with various short-term risks to health including: increased risk of injuries (Hingson & Howland, 1993); road traffic accidents; unsafe and unwanted sexual contact (Standerwick, Davies, Tucker & Sheron, 2007); and alcohol poisoning (NHS Choices, 2011). Long-term consequences of BD behaviour may include an increased risk of a number of serious physical health complaints (Theobald, Johansson, Byrgen, & Engfeldt, 2001), and mental health difficulties, including future alcohol dependency (NHS Choices, 2011). Given the possible consequences of BD behaviour, and the high prevalence of this pattern of drinking in students, it is important to study the problem in

this population. University students, as opposed to young adults who do not attend university, may be more vulnerable to this pattern of drinking and subsequent negative consequences due to the socially acceptable, normative nature of heavy drinking on campuses (Taylor & Nestel, 2014), heavy workloads, financial difficulties and debt related to attending university, and potentially leaving home for the first time, away from their usual support mechanisms.

Theoretical perspectives on binge drinking

A range of theoretical perspectives have been used to explain BD behaviour, including attachment-related, cognitive, and motivational perspectives. This section reviews the theoretical background underpinning the key variables of interest: insecure attachment; dispositional mindfulness (DM), seen as an affect-regulation strategy; alcohol expectancies; and approach/avoidance motivational tendencies. Each of these psychological constructs has been found to be an explanatory factor of BD behaviour. The study of these factors and the relationships between them may identify avenues for the implementation of harm-reduction strategies or intervention.

Insecure attachment: Theoretical background

Bowlby's (1969) theory of attachment proposed that the relationship a child has with caregivers influences their emotional development. Bowlby suggested that through interactions with the mother, a child learns necessary skills for survival and develops an 'internal working model' (IWM), which shapes how they view the world, themselves, and others, and that this representation can remain stable throughout the lifespan and can affect adult relationships. Bowlby theorised that those with a more secure attachment style are able to feel safe in relation to others, are able to regulate their emotions, and are likely to see themselves as lovable and worthwhile. He hypothesised that difficulties in relationships with caregivers can lead to an

insecure attachment style, which can lead to vulnerabilities in the IWM of self and others. Ainsworth and Bell (1970) expanded on Bowlby's theory and delineated four attachment-types: secure, insecure-avoidant, insecure-ambivalent/anxious, and insecure-disorganised. Bartholomew and Horowitz (1991) also described four attachment types, including the 'preoccupied' dimension, which corresponds to a description of anxious attachment, characterised by a negative view of the self as unworthy and unlovable, a positive view of others, and an overwhelming fear of rejection or abandonment. The 'fearful' dimension can be seen as a form of avoidant attachment characterised by negative views of the self as unworthy and unlovable, and of others as untrustworthy and likely to abandon or reject the person (Bartholomew & Horowitz, 1991).

BD in student populations has been found to occur most frequently in social situations (often in groups prior to going to bars or clubs, known as 'pre-drinking', 'pre-partying', or 'pre-loading'; see Foster & Ferguson, 2013). It can be hypothesised that these are the types of situations that could trigger aspects of the negative IWM in students with an insecure attachment style. So, for people with a 'preoccupied' attachment it may be any perceived social rejection that triggers the IWM whereas for those with a 'fearful' attachment social intimacy itself may act as a trigger. Additionally, when in distress, insecurely attached adults are unlikely to rely on the support of people around them, and are likely to have a reduced ability to regulate their own emotions, meaning that they may seek out other external means of doing so, potentially including the use of substances (Thorberg & Lyvers, 2010).

In summary, attachment theory implies that one's attachment style and subsequent behaviours, thoughts, and feelings in relation to others and the self has a direct impact on the way one relates to others in adulthood. It is plausible that students with an insecure adult attachment

style may feel uncomfortable in social situations, for different reasons depending on the type of attachment insecurity, leading to negative affect. Due to difficulties in affect-regulation this may be managed using external sources, such as BD behaviour.

Research evidence for the link between insecure attachment and BD behaviour

There is an existing body of literature exploring the association between insecure attachment styles and BD behaviour in student populations. Generally, students with an insecure attachment, both anxious/preoccupied and avoidant/fearful styles, tend to consume alcohol more frequently and heavily than their securely attached counterparts (Doumas, Turrisi, & Wright, 2006; Kassel, Wardle & Roberts, 2007). This effect may be mediated by the presence of particular motivations or expectancies related to alcohol use (McNally, Palfai, Levine, & Moore, 2003; Molnar, Sadava, DeCourville, & Perrier, 2010; Backer-Fulgham, Patock-Peckham, King, Roufa, & Hagen, 2012).

Molnar *et al.* (2010) tested the theory that insecure attachment is a primary predictor of coping and social motives (e.g. drinking to cope with negative affect, stress, or difficult experiences, and drinking to increase sociability or make social situations more enjoyable) which in turn predict BD behaviour among students. They found support for the suggested pathways: higher attachment anxiety was related positively to both coping and social facilitation motives, and, in turn, high-risk drinking; attachment avoidance was related positively to high levels of coping motives but lower levels of social facilitation motives. Attachment anxiety was also found to have a direct effect on drinking behaviour, actually leading to lower levels of high-risk drinking. It is possible that people with anxious/preoccupied attachment styles, in the absence of problematic motives or expectancies relating alcohol use to increased social functioning and enhanced coping, may drink less because they do not want to risk being viewed negatively due

to intoxication. However, if they do hold such expectations, the likelihood that they will engage in high-risk drinking behaviour increases.

The use of structural equation modelling here allowed Molnar *et al* (2010) to test a hypothesised pathway linking attachment style, positive alcohol expectancies, and drinking behaviour. However, the sample only included first-year students, which is problematic since events in the university calendar or experiences particular to this group might have impacted on alcohol use (e.g. Fresher's Week, first-year exams, first time living away from home), which was not accounted for in the model.

Doumas *et al.* (2006) assessed the relationships between athletic status, attachment style, and BD behaviour. This study utilised a cross-sectional method, where primarily female (70%), Caucasian (90%) students from general psychology courses were asked to complete a questionnaire during the Fall semester of the first year. A hierarchical regression analysis found that attachment avoidance was related to high-risk drinking for people who used to or were currently taking part in athletic activities, but lower drinking levels in non-athletes. Perhaps being committed to and involved in sporting activities exposes students with avoidant attachment styles to social situations and relationships (e.g. with team mates) that they would otherwise be able to avoid. Therefore, students involved in athletic activities may use alcohol as a way of coping with the negative affect this increased exposure to social situations causes, whereas non-athletes with avoidant attachment styles may simply avoid these situations, thus negating the need to use alcohol as an external affect-regulation strategy. The authors concluded that student athletes use alcohol to regulate discomfort during unfamiliar or new situations.

While this adds further support to the idea that insecure attachment styles are related to BD behaviour in students, there are a number of problems. Firstly, the sample was relatively homogenous (70% female, 90% Caucasian), which may mean it lacks generalisability to other student populations. Again, the data collection took place at one time-point in the university calendar, meaning that particular events might have contributed to the results. Additionally, given the focus on student athletes, university sporting events occurring at that time may have temporarily changed these participants' drinking patterns, creating an artificial distinction between athletes and non-athletes. Finally, an assumption is made that avoidant attachment gives rise to expectancies that alcohol will help to regulate negative or difficult affect, without actually testing this. Although other studies, including the Molnar *et al*, (2010) study reported above, do lend support to this hypothesis, further investigation of this relationship is required (McNally *et al*, 2003).

Finally, LaBrie, Thompson, Ferraiolo, Garcia, Huchting, and Shelesky (2008) studied the effect of relational health (e.g. the strength of the connection felt within relationships) on alcohol consumption and alcohol-related consequences in female first-year university students. A moderation analysis found that women who had stronger relational health (e.g. stronger, perhaps more secure, relationships to their peers) and higher motivations for drinking alcohol involving enhancing social effectiveness and coping with stress consume more alcohol. They also found that such women are less likely to suffer negative consequences related to alcohol use. This is the only study reviewed that found that more securely-attached participants drank more than their insecurely attached counterparts. However, a number of factors should be taken into account.

Although one's relational health would seem to be linked to one's attachment style, this study used a questionnaire that was not specifically measuring adult attachment style. The questionnaire used measured how connected participants felt to 1) peers, 2) a mentor, and 3) the community in general. It may be that this measure of relational health and measures of attachment style are looking at subtly different concepts, which might explain the contradictory results. Secondly, although the conclusion was that students with stronger relational health drink more, it should be noted that the average number of drinks consumed per drinking occasion in this sample was $M = 3.37$, $SD=1.48$, which would place most of the sample under the expected cut-offs indicative of BD. Given the high numbers of students generally found to engage in BD, it is questionable as to how representative this sample is of the wider student population. Since this sample actually seemed to consist of generally light drinkers, it is possible that a strong feeling of connection to the people around us may lead to a pattern of light social drinking marked by less frequent social consequences. Lastly, the sample was made up of entirely female, first-year students, who completed the study at a very early time point in their university careers, perhaps influencing the results and making them less generalisable to other samples of students.

There is some evidence for a direct relationship between anxious/preoccupied insecure attachment style and drinking; with fears of being judged harshly by others due to intoxication leading to lower levels of alcohol use (Molnar *et al*, 2010), and further research is needed to elucidate this link more clearly. However, the majority of research reviewed in this area suggests that the relationship between insecure adult attachment styles and drinking is mediated by cognitive factors such as motivations and expectancies that alcohol might enhance social functioning and help a person to cope with difficult experiences (e.g. Kassel *et al*, 2007, LaBrie *et al*, 2008, Molnar *et al*, 2010). This mediated relationship is in line with attachment theory,

which suggests that a person's attachment style leads to the development of IWMs which consist of cognitive, affective, and behavioural responses to self and others. Insecurely attached students may be more likely to feel uncomfortable in social situations, either due to perceived rejection by peers or through a dislike of social intimacy, which may trigger negative emotional states. In turn, insecurely attached adults tend to show lower ability to independently regulate negative affect, and it is possible that this may subsequently lead to a search for external methods of regulation, including alcohol, with the concomitant expectation that alcohol may help them to cope with difficult emotions and also feel more comfortable in social situations. Further study of the relationship between insecure attachment styles, affect regulation strategies, and alcohol expectancies, and the pathway through which these may be related to BD behaviour would be useful.

Affect regulation and dispositional mindfulness (DM): Theoretical background

Mindfulness is often defined as a way of paying attention to experiences in the present moment in a non-judgemental and accepting way (Kabat-Zinn, 1994). One's ability to be mindful can be trained through the use of meditation techniques (Bowen, Witkiewitz, Dillworth, & Marlatt, 2009), but mindfulness can also be viewed as a dispositional trait, with individuals who possess higher DM presenting with greater levels of awareness and attention to experiences in the present moment (Brown & Ryan, 2003). DM can be seen as a non-evaluative affect-regulation strategy which differs from traditional cognitive strategies, which require an ability to reappraise difficult emotions or events (Goldin, McCrae, Ramel, & Gross, 2008).

Interventions aimed at increasing mindfulness and reducing the use of substances in people displaying problematic substance use have been utilised frequently with some success (e.g. see Chiesa & Serretti, 2014). The mechanism of effect appears to be that increasing mindfulness decreases the severity of symptoms such as anxiety, depression and stress which can lead to

difficulties with substance use (Zgierska *et al*, 2009). This provides some evidence for the important role of affect- regulation abilities in the form of DM in ameliorating problematic drinking behaviour.

As mentioned in the previous section, insecure attachment styles are thought to lead to difficulties in the development of healthy affect-regulation strategies. Securely-attached adults generally have positive beliefs about their own ability to alleviate distress, more positive views of the self and others, and adaptive strategies of maintaining mental health in difficult circumstances, such as seeking support from others (Mikulincer, Shaver & Pereg, 2003). Conversely, adults with negative attachment experiences tend not to see support-seeking as a viable or effective way of alleviating their distress and thus have to rely on ‘secondary strategies’ to manage these feelings (Mikulincer & Shaver, 2005). These secondary strategies are expressed in one of two ways: 1) in anxious/preoccupied attachment styles, very intense and insistent attempts to gain proximity to others (sometimes called ‘hyperactivating strategies’); or 2) in avoidant/fearful attachment styles, inhibition of any form of proximity-seeking behaviour, and attempts to handle distress and negative affect independently (or ‘deactivating strategies’) (Mikulincer & Shaver, 2005). Hyperactivating strategies are characterised by affect-regulation techniques that rely on rumination about potential threats to significant relationships and focus attention on negative emotions (Caldwell & Shaver, 2012). Deactivating strategies conversely are characterised by emotional inhibition, thought suppression, and limited attempts to acknowledge or understand emotional states (Caldwell & Shaver, 2012). Such techniques have been found to be utilised frequently by people who have lower DM (see Baer, Smith, & Allen, 2004; Feldman, Hayes, Kumar, Greeson, & Laurenceau, 2007; Raes & Williams, 2010).

The cognitive and emotional patterns that form through consistent use of either hyperactivating or deactivating strategies will perhaps diminish a person's ability to respond to their internal and external experiences in an open, attentive, accepting, and non-judgemental way, meaning that they will have lower levels of DM (Caldwell & Shaver, 2013). People who show higher levels of DM also tend to show lower stress levels in reaction to difficulties, less reaction to perceived threats against the self, better ability to regulate their emotions and behaviours without resort to external methods, and greater relationship satisfaction (Shaver, Lavy, Saron, & Mikulincer, 2007). The same correlations have also been found in people with secure attachment styles (Mikulincer & Shaver, 2007), perhaps suggesting that the typical pattern of affect regulation shown by securely attached adults most closely resembles the non-judgemental, accepting responses related to higher levels of DM.

In summary, research has suggested that insecure attachment styles are related to particular patterns of affect-regulation characterised by either high levels of rumination and proximity seeking (anxious attachment) or emotional inhibition and thought suppression (avoidant attachment) and, as a consequence of these strategies, lower levels of DM, which can be seen as an affect-regulation strategy antithetical to both.

Research evidence for the link between DM and BD behaviour

A number of studies have examined the relationship between DM and drinking behaviour in students (for example, Ostafin & Marlatt, 2008; Leigh & Neighbors, 2009; Fernandez, Wood, Stein, & Rossi, 2010; Eisenlohr-Moul, Walsh, Charnigo, Lynam, & Baer, 2012; Vinci, Peltier, Shah, Kinsaul, Waldo, McVay, *et al*, 2014). Leigh and Neighbors (2009) evaluated whether

expectancies that alcohol will enhance pleasant feelings/sensations and make it easier to cope with distress, act as mediators between mindfulness and alcohol consumption in university students. A positive correlation was found between levels of mind/body awareness and alcohol consumption in men, and non-attachment to thoughts was related to less drinking in men. Moreover, beliefs about using alcohol for social enhancement or coping purposes mediated these relationships in male participants. The positive relationship between mind/body awareness and increased alcohol consumption is an unexpected result, since an ability to be aware of one's mind and body is thought to be an ability associated with higher DM, which has been linked to lower drinking levels in clinical samples (Garland, Boettiger, Gaylord, Chanon, & Howard, 2012).

However, the measure of mindfulness used here was originally developed using a sample of experienced meditators, for whom an awareness of mind/body experiences would include an awareness of both positive and negative sensations equally and with acceptance. This may not be the case in a student sample with no meditation experience. The result that social-enhancement beliefs mediate the link between mind/body awareness and alcohol consumption in men could suggest that this sample were only aware of the positive or pleasant sensations that arose as a result of drinking. Potentially, this strengthened the belief in the efficacy of alcohol to enhance these sensations, which in turn led to increased consumption. Conversely, it may be that increased mind/body awareness was experienced as mildly aversive, leading to a belief that alcohol could dampen these sensations, again leading to greater alcohol consumption. The authors suggested that this effect might not have been present for women because the intake of large quantities of alcohol tend to mean that women reach intoxication more quickly (due to differences in absorption and oxidation of alcohol), thus meaning that

they are not able to bring awareness to the subtle shifts in bodily sensations that result from drinking.

Fernandez *et al* (2010) used the Five Facet Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006) to examine the relationship of these factors of mindfulness to alcohol consumption and alcohol-related consequences in students. The five factors measured are: 1) an ability 'to observe', 2) 'to describe' one's internal and external experiences, 3) in a 'non-judging' and 4) 'non-reactive' manner, and to 5) 'act with awareness'. The mean maximum number of drinks consumed by males in this sample on one occasion was $M = 8.95$, $SD = 5.17$ and for females was $M = 5.58$, $SD = 2.89$, implying that the majority of the sample were displaying BD behaviour. Significant negative correlations were found between alcohol use and a person's ability to 'act with awareness' and 'describe' (or identify and label) their internal and external experiences. It is plausible that those who score highly on the 'describe' factor have a reduced tendency to engage in thought suppression or thought avoidance, which have been associated with higher alcohol consumption (Bowen *et al*, 2009). Additionally, research has suggested that some of the processes that predict alcohol use are implicit, and take place below the level of conscious awareness (Ostafin & Marlatt, 2008). It is possible that those who score higher on the ability to 'act with awareness' may be more likely to bring such cognitive processes into focus and thus decide how to respond to them. It is notable that the findings here are somewhat different to those of Leigh and Neighbors (2009) above. The mind/body awareness variable in their study is conceptually similar to the 'observe' factor on the FFMQ and non-attachment to thoughts and feelings is conceptually similar to the 'non-reactivity' factor of the FFMQ. However, no relationships were found between these factors and drinking behaviour in the Fernandez *et al* (2010) study. Firstly, this highlights the array of measures of mindfulness in use currently, and, despite assumed similarities between

these measures, we do not know whether they are actually measuring the same concepts. Additionally, because some of the measures were developed using experienced meditators we do not know how valid or reliable these measures are when applied to non-meditating student samples. Secondly, this highlights that DM may not be a unitary construct, instead representing a number of different dimensions, all of which may relate differently to drinking behaviour in students. Further research is needed to elucidate these relationships.

Eisenlohr-Moul *et al.* (2012) also looked at the relationship of the five factors of the FFMQ to alcohol use in students. They predicted that students scoring higher on the ability to ‘observe’ their internal and external experiences would tend to consume more alcohol, unless they were also able to be ‘non-judging’ and ‘non-reactive’ to these observed experiences. Their findings supported this hypothesis. Much like the finding that greater ‘mind/body awareness’ increased drinking in male students (Leigh and Neighbors, 2009), it seems that simply being able to focus on one’s internal and external experiences may actually lead to increased drinking behaviour. It is possible that, as in the Leigh and Neighbors (2009) study, an observation of pleasant sensations following alcohol consumption leads to further drinking behaviour. It may also be the case that an enhanced ability to observe negative sensations or experiences leads to alcohol consumption in an attempt to cope with these observations. Unless one’s abilities to observe experiences are combined with an ability to be accepting of those experiences, whether they are positive or negative, and an ability not to react to passing positive or negative sensations or affective states, alcohol may form part of the response to what is observed.

Vinci *et al.* (2014) used an experimental method to investigate whether a mindfulness intervention would lower levels of negative affect, or increase willingness to experience negative affect, and reduce urges to drink in a high-risk student sample (82% of the sample

displayed BD behaviour). Students completed an online questionnaire and were invited to take part in the experimental phase of the study. In this phase, they were randomly assigned to one of six experimental groups: one group received a 10-minute mindfulness intervention, another received a 10-minute relaxation intervention, and the control group completed crossword puzzles for 10 minutes. All participants then completed measures of DM, negative affect, and urge to drink again. Following this, participants either received a negative or neutral affect manipulation involving viewing images; participants in the mindfulness intervention group were asked to use their newly acquired skills when looking at the images. Lastly, participants completed the measures again. It was found that the mindfulness intervention did increase scores on a mindfulness measure and reduced negative affect, but did not reduce the urge to drink. Previous studies have found that brief mindfulness interventions decrease the urge to drink in healthy undergraduates who are not considered to be displaying at-risk drinking behaviour (Arch & Craske, 2006). It is possible that such a brief intervention is not sufficient for students who like the Vinci *et al* (2014) sample, display heavier drinking patterns.

In summary, it seems that DM needs to be considered as a multi-faceted construct, with each facet potentially having a different relationship to alcohol use in students. Generally, higher DM abilities to ‘observe’ or ‘describe’ aspects of experience in this population are associated with increased alcohol use, but when these abilities are accompanied by an ability to be ‘non-judgemental’ and ‘non-reactive’, and to ‘act with awareness’ in response to experiences, they tend to lead to lower levels of alcohol use. The hyperactivating affect-regulation strategies seen in anxious/preoccupied attachment involve rumination and monitoring for threat. Higher levels of ‘observe’ and ‘describe’ abilities would allow a person to focus their attention on spotting potential threats, but this may increase distress and negative affect in social situations leading to higher alcohol use. Similarly, deactivating strategies involve inattention to negative affect

and attempts at thought suppression. Again, higher DM abilities to ‘observe’ and ‘describe’ experiences may make it difficult for a person to suppress negative thoughts and emotions, leading to an increase in negative affect and higher alcohol use. It is proposed that both of these strategies and profiles of DM may be linked to greater likelihood of BD behaviour in students. Further exploration of the relationship between insecure attachment styles and affect-regulation strategies, and their link to BD behaviour is required to gain a better understanding of the psychological processes involved.

Alcohol expectancies: Theoretical background

Expectancy Theory, derived in part from social-learning perspectives, suggests that most behaviour can be explained by assessing whether people have expectations that the behaviour they are displaying will have reinforcing outcomes (Jones, Corbin, & Fromme, 2001). In terms of alcohol use, people will often hold outcome expectancies that are linked in some way to their pattern of consumption (Jones *et al*, 2001). So, for example, a person who displays a typical BD pattern may hold expectations that consuming alcohol will improve their social skills or make them more likeable/attractive to other people. Such an expectation could increase the likelihood that they will display BD behaviour again at some future time point in a similar situation. Conversely, someone who holds negative alcohol outcome expectancies, for example that alcohol will make it hard to think straight or will negatively impact on their behaviour, may avoid or limit their alcohol intake. Indeed, research has suggested that endorsement of positive expectancies increases the likelihood of alcohol consumption, whereas endorsement of negative expectancies decreases the likelihood in student samples (e.g. Leigh & Stacy, 2004).

However, the relationship between alcohol expectancies and actual alcohol intake may be more dynamic (Jones *et al*, 2001). In line with social learning theory, alcohol expectancies impact on drinking behaviour, but may also be reciprocally influenced by a person's experiences with alcohol. For example, a person who holds the expectancy that alcohol will make them more confident and effective in social situations might be more likely to show a consumption pattern in line with this expectation. Additionally, if they drink and do experience the feelings of greater confidence and affiliation to others that they expect, this could strengthen their previously-held alcohol expectancy. Conversely, someone holding the same expectation but who experiences rejection from others or feelings of low mood and loneliness after drinking alcohol may revise their alcohol expectancies over time to more closely mirror their actual experience. Individual differences in alcohol expectations and experiences with alcohol could explain a range of different patterns of alcohol consumption.

We must make a number of assumptions when suggesting that alcohol expectancies play a significant role in influencing drinking behaviour. Firstly, as suggested above, it is expected that people with different patterns of drinking will hold different alcohol expectancies. However, the evidence for this is unreliable. For example, heavier drinking has been associated with the global endorsement of positive alcohol expectancies, but in particular with expectancies around social effectiveness, physical pleasure, and tension reduction (Scott-Sheldon, Terry, Carey, Garey, & Carey, 2012). However, other studies have shown that drinkers' expectancies tend to fluctuate on a daily basis, and a range of negative and positive expectancies can be reported irrespective of drinking pattern (Lee, Atkins, Cronce, Walter, & Leigh, 2015). While it is not possible to give a definitive list of the types of alcohol expectancies that will be endorsed by drinkers with different patterns of alcohol consumption, there is evidence to suggest that positive alcohol expectancies are associated more strongly

with the quantity (e.g. the amount consumed in one sitting) rather than the frequency of drinking (Lee, Greely, & Oei, 1999). Conceivably then, BD behaviour, which is typified by the consumption of high quantities of alcohol in a single session, but not necessarily by a high frequency or number of drinking episodes, can be related to a particular pattern of alcohol expectancies in line with this behaviour.

Secondly, given the potentially reciprocal nature of the relationship between alcohol expectancies and actual experience with alcohol, one would assume that alcohol expectancies might change over time as part of a feedback loop involving lived consequences of drinking. It has been found that procedures designed to challenge positive alcohol expectancies significantly lower people's endorsement of positive expectancies and reduce subsequent consumption (see Larimer & Crouce, 2007). In people undergoing treatment for alcohol problems, positive expectancies have been found to decrease and negative expectancies increase as treatment progresses (Jones & McMahon, 1996). Patrick, Wray-Lake, Finlay, and Maggs (2010) found a relationship between positive alcohol expectancies held in adolescence and increased use of alcohol in adulthood, and Leeman, Toll, Taylor and Volpicelli (2009) found that students in their first year at university who held positive expectancies about alcohol were more likely to be displaying BD behaviour in their final year. Lastly, one study found an association between positive alcohol expectancies and the emergence and persistence of alcohol dependence in young adults (Kilbey, Downey, & Breslau, 1998). This study shows that lower negative alcohol expectancies identified those participants who went on to develop alcohol dependence over a three-year follow-up period. Although the effect size here was small, this is an important finding, since the presence of BD behaviour in students has been associated with future alcohol dependence in some people (NHS Choices, 2011). It is plausible that binge-drinking students with globally positive alcohol expectancies may consume higher

quantities of alcohol at each BD session (e.g. well above the four or five drink cut-off) and be more likely to develop future dependency symptoms, whereas those with a range of positive and negative expectancies might consume less alcohol (while still within the range classified as a binge) and be protected from future difficulties. Conversely, holding both positive and negative expectancies about alcohol may actually indicate ambivalence about alcohol use, which is a common feature in alcohol dependence in clinical samples (see Dickson, Gately, & Field, 2013).

Thirdly, most research looking at alcohol expectancies has used measures that only require a participant to indicate whether they hold or do not hold a particular expectancy. It may also be important to assess the subjective valence attached to these expectancies (Fromme, Stroot, & Kaplan 1993). It is conceivable that someone might expect that consuming alcohol will induce temporary cognitive impairment or an increase in aggressive behaviour, but may subjectively rate those effects as positive rather than negative. For example, short-term cognitive impairment could be construed as positive in certain situations if someone actively wants to 'forget' their worries for a while. In accord with this view, Werner, Walker, and Greene (1993) found that stronger endorsement of positive alcohol expectancies and more favourable subjective evaluations of expectancies labelled as 'negative' by questionnaire measures were associated with heavier drinking and greater alcohol-related consequences in students. However, the research in this area is conflicting. For example, some studies have gathered separate ratings for endorsement of alcohol expectancies and subjective evaluations of alcohol expectancies as positive or negative, and found that stronger positive expectancies are associated with higher levels of alcohol use regardless of whether they are measured using endorsement or subjective rating (Fromme *et al*, 1993; Wood, Sher, & Strathman, 1996).

Overall, the evidence in this area suggests that alcohol expectancies may play a substantial role in describing and explaining different types of drinking behaviour.

Research evidence for the link between alcohol expectancies and BD behaviour

There is a great deal of existing research exploring the link between alcohol expectancies and drinking behaviour specifically in students (for example, Bitarello do Amaral, Lourenco, & Ronzani, 2006; Zamboanga, Horton, Leitkowski, & Wang, 2006; Holt, Armeli, Tennen, Austad, Raskin, Fallahi, *et al*, 2013). Generally, this body of research indicates that students who report the heaviest drinking behaviour also tend to report stronger positive alcohol expectancies and weaker negative alcohol expectancies. Alcohol expectancies frequently found to be positively correlated with heavier drinking have included expectations of increased social and sexual enhancement and tension reduction.

Holt *et al* (2013) used latent profile analysis on a sample of first-year undergraduates to assess whether symptoms of depression and anxiety, alcohol expectancies, negative life events, and drinking motives predict different patterns of drinking and drinking-related problems. They found five 'classes' of drinkers: classes four and five displayed the highest drinking levels (22% of the overall sample, $M = 15.92$, $SD = 9.99$, and $M = 17.40$, $SD = 11.34$ drinks per week respectively) and highest frequency of problems. Class five ($M = 17.40$, $SD = 11.34$ drinks per week) expected drinking alcohol to result in positive outcomes, reported lower levels of social support, greater levels of negative affect, and endorsed high levels of social enhancement and coping motives. Class one exhibited lower drinking levels and less drinking-related problems (34% of the sample, $M = 9.88$, $SD = 8.40$ drinks per week), they reported high levels of social support, lower positive alcohol outcome expectancies, and less endorsement of coping, social

enhancement, and conformity motives for drinking. Class three ($M = 14.93$, $SD = 10.20$ drinks per week) displayed relatively high drinking levels, high social enhancement motives, high social support, and higher positive expectancies. It can be hypothesised that those students displaying the most problematic drinking (class five) are using alcohol as an external means of coping with negative affect due to a perceived lack of social support. Indeed, the light drinking group in class one reported high levels of social support and reduced positive expectancies and motivations for drinking. However, for those in class three, high levels of social support were linked to high positive expectancies, and social enhancement motivations for drinking. Conceivably, this second group of heavy-drinking students may have been using alcohol solely as a means of facilitating a sense of social connectedness to their peers, rather than to cope with negative affect.

Unfortunately, because this study included only first-year students, we do not know whether students remained within the same identified 'classes' throughout their time at university, or whether motivations for drinking and alcohol expectancies changed over time. For example, perhaps the heaviest drinking group here (class five) reported lower levels of perceived social support because it was their first year in a new environment, and they had been separated from long-term friendship groups and family support when they moved away from home, and so temporarily used alcohol as a means of coping with difficult emotional experiences. If this were the case, their motivations and expectancies about alcohol as a coping mechanism may have changed as they developed stronger friendship groups in subsequent years at university. Additionally, due to the use of cross-sectional data, this study does not allow us to assess whether drinking behaviour and alcohol expectancies reciprocally influence each other, or whether the relationship is unidirectional (e.g. positive alcohol expectancies lead to higher levels of drinking).

Bitarello do Amaral *et al* (2006), studied the relationship between alcohol expectancies and consumption in a sample of students in their first and final years on various courses of study. Fifty-nine percent of the total sample was drinking at a 'risky' level, but only 8.2% reported a BD episode in the last month. There were no differences found between drinking levels in different courses or years of study. The authors found that higher endorsement of positive expectancies is linked to higher levels of alcohol consumption in both first- and final-year students. The proportion of student participants reporting binge episodes was very low in this study, perhaps suggesting that alcohol use levels were being minimised, thus impacting on the extent to which this data is generalisable. This student sample was taken from a Brazilian university; cultural differences may exist in terms of alcohol use and acceptability of certain patterns of drinking, which might also account for the low levels of BD behaviour reported. Again, this sample may not be generalisable to a UK sample.

Zamboanga *et al* (2006) attempted a longitudinal study looking at the potential reciprocal relationship between positive and negative drinking expectancies and hazardous alcohol use (classified as a score of 8 or above on the AUDIT; unfortunately no data was reported about BD behaviour in the sample). Participants completed measures assessing the key variables at baseline and again one year later. The authors found that positive alcohol expectancies predicted increased likelihood of hazardous drinking at baseline, and one year later after baseline drinking levels were accounted for. The finding of a link between positive expectancies and higher alcohol use is consistent with cross-sectional research such as Bitarello do Amaral *et al* (2006) described above.

These findings suggest that over a one-year period positive alcohol expectancies may lead to hazardous alcohol use and that this relationship tends to stay consistent. It also gives us some evidence to suggest that the relationship between expectancies and alcohol use may be unidirectional, rather than reciprocal, at least over a one-year period. However, although this is a longitudinal study, further research over longer time periods is needed to be confident about these conclusions. Additionally, the student sample used here consisted of female athletes, and the generalisability of such a sample to all students is dubious. Lastly, although it is commonly found that negative alcohol expectancies do not influence drinking behaviour, the measure used here only looked at proximal or immediate negative effects of alcohol (e.g. slurred speech, short-term memory loss, and lack of co-ordination). Research looking at distal negative consequences of drinking such as 'hangover' or impact on job/educational performance has found a link between negative expectancies and drinking behaviour in social drinkers (e.g. McMahon, Jones, & O'Donnell, 1994). This suggests that future research assessing alcohol expectancies needs to use measures that look at both positive and negative expectancies, including the full range of short- and long-term negative consequences.

In summary, previous research has found associations between alcohol expectancies and drinking behaviour. In particular, it seems that greater endorsement of positive alcohol expectancies tends to be linked to heavier drinking. Positive expectancies, about alcohol's ability to reduce tension or act as a coping mechanism in difficult circumstances, and as a way to improve social performance, has tended to be associated with heavier drinking. Research remains unclear about the role of negative expectancies in non-clinical, student populations, although cross-sectional data suggests that negative expectancies lead to lighter drinking patterns. In line with the theoretical background outlined above, it seems that different patterns of expectancies may relate to distinct patterns of drinking (Holt *et al*, 2013). Holt *et al* (2013)

suggested that BD behaviour may be influenced by both high tension reduction/coping expectancies and high social enhancement expectancies. The study also suggested that these expectancies may lead to drinking behaviour for different reasons. For example, students high in the expectancy that alcohol will help them to cope with stress and tension may be using alcohol as an external coping strategy in the absence of or under-utilisation of suitable social support mechanisms whereas students high in social facilitation expectancies may display drinking behaviour to bring them closer to their peers.

Additionally, although there is little longitudinal research looking at the bi-directional relationship between expectancies and alcohol use in students, Zamboanga *et al* (2006) found support for a unidirectional relationship between positive expectancies and greater alcohol use over a one-year period. Previous research on adolescent drinking patterns, expectancy, and alcohol use has also found a linear relationship, with positive alcohol expectancies tending to predict higher alcohol use (Christiansen, Smith, Roehling, & Goldman, 1989). It is generally thought that in adolescence and early adulthood people have not had enough experience with the effects of alcohol for their drinking experiences to impact on or change their alcohol expectancies, and as such the relationship appears to be unidirectional at this early stage, but possibly reciprocal later on as they gain more drinking experience. In line with research and theory, it is conceivable that in university students, still at a relatively early stage in their use of alcohol, the relationship between expectancies and alcohol use is likely to be linear, with higher positive expectancies leading to greater alcohol use. If this is the case then there is the potential that attempts to adjust alcohol expectancies in students displaying BD behaviour may be a useful harm-reduction strategy that could be employed prior to the formation of a potentially problematic, entrenched drinking pattern later in adulthood.

Approach/avoidance motivations: Theoretical background

Recent research describes motivational processes in relation to alcohol as involving two distinct and competing inclinations, one to approach and one to avoid the desired substance (Breiner, Stritzke, & Lang, 1999). Thus, a person can have a combination of high and low approach and avoidance motivational tendencies toward alcohol. The development and validation of measures such as the Approach and Avoidance of Alcohol Questionnaire (AAAQ; McEvoy, Stritzke, French, Lang & Ketterman, 2004) in different groups has provided evidence of a distinction between approach and avoidance systems in alcohol-dependent (Klein, Stasiewicz, Koutsky, Bradizza, & Coffey, 2007) and non-dependent (including student) samples (McEvoy *et al.*, 2004).

The concept of two distinct and potentially competing motivational systems is described by Gray (1975), who developed a model which emphasises two systems: the behavioural approach/activation system (BAS) and the behavioural inhibition system (BIS). The BAS is involved in the pursuit of reward and positive reinforcement from behaviour, whereas the BIS is implicated in the inhibition of particular behaviours as a response to punishment or lack of reward. The BAS and BIS constructs are conceptually similar to the approach and avoidance motivations measured by the AAAQ described above. The BAS has been linked to disinhibited behaviour with regards to alcohol use (e.g., Katz, Fromme, & D'Amico, 2000; O'Connor & Colder, 2005), indicating that for people with a particularly strong BAS the effects of alcohol will be perceived as rewarding and this in turn will lead to appetitive behaviours and increased drinking.

Similarly, the ambivalence model of craving hypothesised that a person can hold competing tendencies to drink (approach) and not to drink (avoidance) at the same time and that different

levels of each inclination might predict different motivational states, and thus distinct patterns of drinking (Breiner *et al*, 1999; Barkby, Dickson, Roper, & Field, 2011). Conceivably, those with low motivations to avoid and approach alcohol may be indifferent to the expected positive or negative effects of drinking, resulting in lighter consumption. People with high approach and low avoidance motivations are likely to value the positive outcomes expected when alcohol is consumed, and be less concerned by any adverse consequences; people with such a profile are likely to fall into a heavy drinking category (Schoenmakers, Wiers, & Field, 2008). The reverse pattern, low approach and high avoidance motivations, may suggest that a person will consider the possible adverse consequences of drinking, such as impact on physical health or detrimental impact on relationships, and may choose to abstain. Finally, an ‘ambivalent’ profile has been identified, that of high approach and high avoidance motivations, which is a pattern more often seen in dependent clinical samples (see, Greeley, Swift, & Heather, 1993).

Some models suggest that other cognitive variables may play an important role in predicting whether approach or avoidance tendencies are activated. For example, Cox and Klinger (1988) described a motivational model of substance use, which implied that several factors influence a person’s motivation to consume alcohol by enhancing or decreasing the level of positive reinforcement they can expect to get from it. One such factor is thought to be an individual’s alcohol expectancies. For example, if a person generally has strong approach motivations to consume alcohol, but also has an exam the next day and academic achievement is important to them, they may have conflicting approach and avoidance motivations in this instance. Additionally, if their alcohol expectancies are that drinking will affect their cognitive abilities negatively, and thus impact on their exam performance, the avoidance motivation may be more strongly activated in this situation. Conceivably, then, someone with a combination of high approach and low avoidance motivations, in addition to positive expectancies that alcohol will

increase social functioning and produce a reduction in tension or stress, is at highest risk of engaging in problematic drinking.

More recently it has been suggested that these processes and evaluations about whether to drink or not drink can occur at different levels of awareness, so a person can have explicit and implicit approach and avoidance inclinations (e.g. inclinations of which they are aware and have some control over and of which they are unaware because they occur quickly and automatically; Cox, Fadardi, & Klinger, 2006; Barkby *et al*, 2011). Self-report measures, such as the AAAQ, are designed to assess explicit approach and avoidance inclinations. Endorsement of statements about wanting to drink and not wanting to drink can occur simultaneously at different levels on such measures in both clinical, alcohol-dependent (who often show high approach and high avoidance motivations) and non-clinical populations, including students (who more often show a high approach and low avoidance pattern) (McEvoy *et al*, 2004; Klein *et al*, 2007), which supports the distinction between the two systems.

Studies looking at implicit, automatic motivational tendencies have found that heavy and alcohol-dependent, but not light social, drinkers have attentional biases for alcohol-related cues (Field, Mogg, Zetteler, & Bradley, 2004; Field & Cox, 2008). Similarly, use of the Implicit Association Test to assess automatic memory associations in connection to alcohol-related cues and approach/avoidance motivations in a non-clinical sample has found strong associations between approach motivations and alcohol-related cues that correlate with frequency of BD behaviour (Palfai & Ostafin, 2003). More direct measures of implicit motivation include Relevant Stimulus-Response Compatibility (R- SRC) tasks, where participants must categorise alcohol-related and neutral images by moving a manikin towards one type of image and away from the other. Typically, this task is split into two sections; one where participants are asked

to move the manikin towards alcohol-related images (approach) and one where they are asked to move the manikin away (avoid). Participants who complete the task faster during the ‘approach’ section of the task are thought to have strong approach motivations towards alcohol. Heavy drinkers have been found to categorise images faster during the approach block than the avoidance block (e.g. Field, Kiernan, Eastwood, & Child, 2008). Similarly, the alcohol approach/avoidance task (AAAT) requires participants to make an approach movement (pulling a joystick) or an avoidance movement (pushing a joystick) in response to alcohol-related or neutral pictures. Again, heavier drinkers have been found to show an approach bias to pictures of alcohol (e.g. Wiers, Rinck, Dictus & Van den Wildenburg, 2009).

Taken together, the models discussed suggest that heavier student drinkers may have alcohol expectancies that increase the amount of positive reinforcement they expect from drinking, and therefore they are also likely to have stronger approach tendencies overall and perhaps much weaker avoidance inclinations. This is in contrast to dependent clinical samples, where a pattern of simultaneous high approach and high avoidance motivations has been seen, suggesting a marked ambivalence in relation to alcohol.

Research evidence for the link between approach/avoidance motivations and BD

behaviour

A limited number of studies have explored the relationship between approach/avoidance motivations and BD in students (see Ostafin, Palfai, & Wechsler, 2003; McEvoy *et al*, 2004; O’Connor & Colder, 2005). All but one study covered by this review are focused on explicit motivational tendencies, assessed using self-report measures, rather than implicit motivation.

McEvoy *et al* (2004) used two student samples, one from Australia and one from the USA, to validate the AAAQ. The two groups completed the AAAQ, as well as measures assessing their quantity and frequency of alcohol use and their experience of alcohol-related consequences. A three-factor model fitted the data best: one factor related to avoidance motivations, one related to mild approach inclinations, and another related to more intense, compulsive approach motivations. AAAQ scales account for 41-53% of the variance in drinking frequency, and 49-60% of the variance in drinking quantity. The mild and intense approach inclinations account for 43% of the variance in alcohol-related consequences, but avoidance inclinations do not significantly account for variance on alcohol-related consequences. Scores on the AAAQ subscales predicted different drinking patterns. Non-drinkers scored significantly higher on avoidance inclinations, and drinkers scored lower on avoidance inclinations than on mild approach inclinations, and this difference increased at riskier levels of drinking. In summary, the authors found support for the suggestion that approach and avoidance inclinations toward alcohol are separate constructs and, moreover, there seems to be a continuum of approach inclinations from mild to more intense. In addition, these separate constructs predict distinct patterns of drinking.

There were differences in the two samples in terms of drinking culture, laws, and attitudes that need to be considered. The authors found that US students endorse the more intense, compulsive approach motivations towards alcohol more frequently than the Australian students. Additionally, self-reported drinking in the US sample was almost twice as high as that of the Australian students. In the US sample, intense approach motivations were predictive of frequency of alcohol use, but not among the Australian students. The authors conclude that the lower drinking age in Australia (18 years; equivalent to that in the UK) may diminish the appeal of drinking to excess, and lead to greater indifference and more mature drinking

practices. The authors also suggest that the relationship of approach and avoidance motivations to other variables implicated in drinking behaviour, such as alcohol expectancies, need to be assessed in order to understand this behaviour fully, in line with the motivational model of drinking described above (Cox & Klinger, 1988).

Ostafin *et al* (2003) studied whether alcohol-related cues automatically activate implicit approach or avoidance motivational tendencies in a binge-drinking student sample. They assessed drinking behaviour and drinking-related consequences using self-report measures. A computerised motivational tendency task was then used to assess implicit approach and avoidance motivations. They found that college students with more problematic drinking patterns displayed weak associations between alcohol-related cues and avoidance motivation. Lower implicit avoidance motivation was specifically related to more frequent BD behaviour and more alcohol-related consequences. The accessibility of implicit approach motivations do not predict at-risk drinking in this sample. The authors attribute this to the possibility that the priming task they use accessed only intense, obsessive positive valences about ‘wanting’ alcohol, rather than positive valences about simply ‘liking’ it, which they thought were more likely to be associated with drinking behaviour in a non-clinical sample. This study suggests that students who exhibit frequent BD behaviour might do so because of a weak relationship between alcohol-related cues and implicit avoidance tendencies and suggests that automatic motivational processes play a role in at-risk drinking.

O’Connor & Colder (2005) examined whether the BAS and BIS predict different patterns of alcohol use in a student sample and whether reasons for drinking or expected outcomes of drinking mediate this relationship. Participants were assessed on the variables of interest using self-report measures. They identified three problematic patterns of drinking: heavy occasional

drinking, with impairment (possibly BD behaviour); very heavy occasional drinkers with impairment (average of 10 drinks per occasion; heavy BD behaviour); and heavy frequent drinkers with impairment (which appear distinct from BD behaviour). Results showed that only the BAS/approach motivations predicted these problematic patterns of alcohol use. Specifically, strong approach motivations predicted falling into either the heavy occasional drinking or very heavy occasional drinking groups. Strong approach motivations did not predict belonging to either the light drinking or abstaining groups, or a group of heavy drinkers who did not experience impairment. Weak avoidance motivations were not predictive of drinking patterns in this sample, which is contradictory to the findings of Ostafin *et al* (2003) above. Lastly, O'Connor and Colder (2005) found that alcohol expectancies partially mediate the link between approach motivations and drinking behaviour. In particular, individuals with strong approach motivations were more likely to drink for enhancement reasons (e.g. to enhance positive affect), social reasons (e.g. to facilitate better social functioning) and coping reasons (e.g. to cope with negative affect). However, it should be noted that this is cross-sectional data and as such the direction of this relationship could be different.

However, the sample consisted of students in a particular age range at a particular point in their academic careers; longitudinal studies and cross-sectional studies across different age groups are needed to assess whether people change their drinking patterns over time and whether explicit approach/avoidance tendencies change in line with this. The finding that only approach motivations predict problematic drinking is different to the Ostafin *et al* (2003) study where only a weak relationship between implicit avoidance tendencies and alcohol-related cues are predictive of more at-risk drinking behaviour. It may be the case that different combinations of weak/strong approach and weak/strong avoidance tendencies, both explicit and implicit, predict different drinking patterns for different reasons.

In summary, there is evidence of separate explicit avoidance and approach motivations in student samples in relation to drinking behaviour, including a continuum of approach inclinations from mild to more intense. In general, self-reported weak avoidance motivations and strong approach motivations have been linked to heavier drinking, including BD behaviour, in student populations and this relationship may be mediated by the alcohol expectancies a person holds.

Summary

This review has indicated that a range of psychological processes are implicated in the explanation of BD behaviour in students. Key findings in relation to insecure adult attachment and BD suggested that this relationship is probably mediated by positive alcohol expectancies and motivations for drinking (McNally *et al*, 2003; Molnar *et al*, 2010; Backer-Fulgham, *et al*, 2012). In particular, an anxious/preoccupied attachment style has been related to expectancies that alcohol will improve social effectiveness and help to manage stress, whereas avoidant/fearful attachment style has generally only been associated with the latter (Molnar *et al*, 2010). More research is needed to elucidate the association between attachment style and BD behaviour, in particular with regards to whether there is any direct relationship between the two, as evidence is mixed on this issue (e.g. LaBrie *et al*, 2008, Molnar *et al*, 2010).

Research has suggested that interventions aimed at increasing mindfulness and decreasing substance use in clinical samples are effective in part because they reduce affective distress (Chiesa & Serretti, 2013). This provides evidence for the idea that DM traits can be conceptualised as an affect-regulation strategy which is very different to the strategies generally implemented by those with anxious or avoidant attachment styles (Zgierska *et al*,

2009). The hyperactivating and deactivating affect-regulation strategies found in those with insecure attachment styles may be associated with a DM profile characterised by high levels of the abilities to ‘observe’ and ‘describe’ experiences, but lower abilities to remain ‘non-judgmental’ and to ‘act with awareness’ in relation to difficulties. This DM profile has been linked to higher levels of drinking in students (Eisenlohr-Moul *et al*, 2012). Similarly, there is evidence for a mediating relationship between DM and BD by positive alcohol expectancies and this requires further study (Leigh & Neighbors, 2009).

Positive alcohol expectancies have been related to BD in student populations, in particular expectancies about improved social and sexual effectiveness and tension reduction (e.g. Holt *et al*, 2013). The suggestion that positive expectancies act as a mediator in the relationship between attachment style and DM, and BD behaviour has been supported by previous research (Leigh & Neighbors, 2009; Molnar *et al*, 2010) and further research of the relationship between all three and motivational tendencies is warranted.

Finally, research has suggested that students tend to display strong approach motivations towards alcohol, and possibly weak avoidance motivations (e.g. McEvoy, 2004). This is in comparison to dependent samples that tend to display simultaneous approach and avoidance motivations towards alcohol (Greeley *et al*, 1993). This pattern of strong approach and weak avoidance is likely to lead students towards a heavy drinking pattern (Barkby *et al*, 2011). The motivational model of drinking (Cox & Klinger, 1988) suggested that whether approach or avoidance tendencies are activated is likely to be associated with one’s beliefs and expectations about the consequences of drinking. Further research is required to elucidate this association.

Methodological considerations and directions for future research

There are a number of methodological considerations pertinent to each area reviewed. In particular, research designs have tended to be cross-sectional, often using only students in their first year of undergraduate studies and sometimes focusing on either males or females or particular groups, such as student athletes. This potentially limits generalisability to the student population as a whole. In general, the majority of studies on BD in students have been conducted in the US, and the few studies using other samples (e.g. a Brazilian sample (Bitarello do Amaral *et al*, 2006) and an Australian sample (McEvoy *et al*, 2004) suggest that there may be considerable differences in drinking behaviour and attitudes towards drinking in other cultural groups. Therefore it may not be appropriate to generalise data from US student samples to UK student samples.

A major consideration is that each of the processes reviewed has a body of literature which constitutes a relatively separate area of investigation. As highlighted above there has been some attempt to look at mediated relationships between these variables and initial efforts to integrate these different processes. However, it is clear that further integration and exploration of the relationships between these variables in relation to BD warrants further theoretical development and investigation. Further study of these relationships may enable the development of a more explanatory model of how BD behaviour develops in some students, particularly those who may be most at risk for future alcohol-related problems.

Potential clinical relevance

Given the prevalence of BD in students, and its association with a range of short-and long-term negative consequences, gaining a good understanding of a person's alcohol use should be considered a key task for psychological practitioners working with this population. Early intervention in this particular form of problematic drinking behaviour may help to reduce some

of the long-term risks. A number of the variables reviewed here, in particular alcohol expectancies (see Wood, Capone, Laforge, Erickson, & Brand, 2007; Lau-Barraco & Dunn, 2008; Scott-Sheldon *et al*, 2012), have been targeted in interventions aimed at reducing alcohol consumption in student populations, with positive results. Scott-Sheldon *et al* (2012) in a meta-analytic review of alcohol interventions for first-year college students in the USA, conclude that the most effective interventions in terms of reducing consumption levels and alcohol-related problems are those combining several different components, including personalised feedback (e.g. about drinking behaviour and the consequences) and moderation strategies (e.g. interventions focused on bringing about change in drinking behaviour). They propose that more research is needed in this area to assess which intervention components are most useful. In order to clarify where interventions would most usefully be targeted in this population, we need to understand the interrelationships between the key psychological processes implicated in BD behaviour; attachment style, DM, alcohol expectancies, and motivational tendencies, as outlined in this review.

Although BD behaviour can be seen as normative among student populations, it is still an important public health concern with a range of associated negative consequences. As such, further study of its psychological processes may be useful in the development of campus-wide harm-reduction strategies aimed at reducing BD behaviour (Elliott & Ainsworth, 2012). For example, strategies aimed at challenging alcohol expectancies by displaying messages highlighting the potential negative consequences of drinking (e.g. a strategy already used on cigarette packaging in the UK) or displaying messages which highlight the potential positive consequences that may come about through other healthier behaviours (e.g. ‘make friends by joining university societies’, or ‘daily exercise helps to deal with stress’) may have some impact on student drinkers. Furthermore, given the strong approach inclinations seen in student

drinkers, additional research is needed into how avoidance motivations can be activated, particularly in an environment/culture where drinking heavily may be viewed as an intrinsic part of any social activity or as a 'rite of passage' (Robinson, Jones, Christiansen, & Field, 2014).

Although access to intervention on an individual level is likely to be rare in a non-clinical, student sample, the association between BD behaviour and other acute physical and mental health difficulties mean that at-risk students may present to student health or other support services. Further knowledge about how the variables covered in this review relate to each other, and the potential pathway/s leading to the development of problematic BD behaviour, may give clinicians important information about where best to target interventions for such individuals. For example, during assessment of alcohol use in students, eliciting a person's attachment style and IWM of self and others may give clinicians key insight about a person's likely affect-regulation strategies, beliefs, and attitudes about alcohol, and motivational tendencies towards drinking. Each of these aspects can be targeted as part of a formulation-driven intervention aimed at reducing BD behaviour.

Conclusion

This review has highlighted the importance of understanding the psychological processes associated with BD behaviour in students. It has explored the theoretical and empirical basis in the explication of BD behaviour in this population, including insecure adult attachment, DM, alcohol expectancies, and approach/avoidance motivations. The potential theoretical links between these variables have been highlighted. However, future research is required to develop a comprehensive and explanatory model that attempts to draw together these key psychological

processes to gain a greater understanding of BD and address this potentially serious student health issue and the risks it entails.

References

- Ainsworth, M. D. S., & Bell, S. M. (1970). Attachment, exploration, and separation: Illustrated by the behavior of one-year-olds in a strange situation. *Child Development*, 41, 49-67. doi:10.1111/j.1467-8624.1970.tb00975.x.
- Arch, J. J., & Craske, M. G. (2006). Mechanisms of mindfulness: Emotion regulation following a focused breathing induction. *Behaviour Research and Therapy*, 44, 1849-1858. doi:10.1016/j.brat.2005.12.007.
- Backer-Fulgham, L. M., Patock-Peckham, J. A, King, K. M., Roufa, L., & Hagen, L. (2012). The stress-response dampening hypothesis: How self-esteem and stress act as mechanisms between negative parental bonds and alcohol-related problems in emerging adulthood. *Addictive Behaviors*, 37, 477–84. doi:10.1016/j.addbeh.2011.12.012.
- Baer, R.A., Smith, G.T., & Allen, K.B. (2004). Assessment of mindfulness by self-report: The Kentucky Inventory of Mindfulness Skills. *Assessment*, 11, 191-206. doi: 10.1177/1073191104268029.
- Baer, R.A., Smith, G.T., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report assessment methods to explore facets of mindfulness. *Assessment*, 13, 27-45. doi:10.1177/1073191105283504.

- Barkby, H., Dickson, J.M., Roper, L., & Field, M. (2011). To approach or avoid alcohol? Automatic and self-reported motivational tendencies in alcohol dependence. *Alcoholism: Clinical and Experimental Research*, 36, 361-368. doi:10.1111/j.1530-0277.2011.01620.x.
- Bartholomew, K. & Horowitz, L. M. (1991). Attachment styles among young adults: A test of a four category model. *Journal of Personality and Social Psychology*, 61, 226-244. doi: 10.1037/0022-3514.61.2.226.
- Berridge, V., Herring, R., & Thom, B. (2009). Binge Drinking: A Confused Concept and its Contemporary History. *Social History of Medicine*, October 2009, pp.1-11. doi: 10.1093/shm/hkp053.
- Bitarello do Amaral, M., Lourenço, L. M., & Ronzani, T. M. (2006). Beliefs about alcohol use among university students. *Journal of Substance Abuse Treatment*, 31, 181–185. doi:10.1016/j.jsat.2006.04.004.
- Bowen, S., Witkiewitz, K., Dillworth, T.M., & Marlatt, G.A. (2009). The role of thought suppression in the relationship between mindfulness mediation and alcohol use. *Addictive Behaviors*, 32, 2324-2328. doi:10.1016/j.addbeh.2007.01.025.
- Bowlby, J. (1969). *Attachment and loss, Vol. 1: Attachment*. New York: Basic Books.
- Breiner, M.J., Stritzke, W.G.K., & Lang, A.R. (1999). Approaching avoidance: A step essential to the understanding of craving. *Alcohol Research and Health*, 23, 197-206.

- Brown, K.W., & Ryan, R.M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology*, *84*, 822-848. doi: 10.1037/0022-3514.84.4.822.
- Caldwell, J.G., & Shaver, P.R. (2012). Exploring the cognitive-emotional pathways between adult attachment and ego-resiliency. *Individual Differences Research*, *10*, 141-152.
- Caldwell, J. G., & Shaver, P. R. (2013). Mediators of the Link between Adult Attachment and Mindfulness. *Interpersona: An International Journal on Personal Relationships*, *7*, 299–310. doi:10.5964/ijpr.v7i2.133.
- Carter, J.A., McNair, L.D., Corbin, W.R., & Black, D.H. (1998). Effects of priming positive and negative outcomes on drinking responses. *Experimental and Clinical Psychopharmacology*, *6*, 399-405. doi:10.1037/1064-1297.6.4.399.
- Chiesa, A., & Serretti, A. (2013). Are mindfulness-based interventions effective for substance use disorders? A systematic review of the evidence. *Substance Use and Misuse*, *49*, 492-512. doi:10.3109/10826084.2013.770027.
- Christiansen, B.A., Smith, G.T., Roehling, P.V., & Goldman, M.S. (1989). Using alcohol expectancies to predict adolescent drinking behavior after one year. *Journal of Consulting and Clinical Psychology*, *57*, 93-99. doi:10.1037/0022-006X.57.1.93.

- Courtney, K.E., & Polich, J. (2009). Binge drinking in young adults: Data, definitions and determinants. *Psychological Bulletin*, *135*, 142-156. doi:10.1037/a0014414.
- Cox, W.M., & Klinger, E. (1988). A motivational model of alcohol use. *Journal of Abnormal Psychology*, *97*, 168-180. doi:10.1037/0021-843x.97.2.168.
- Cox, W.M., Fadardi, J.S., & Klinger, E. (2006). Motivational Processes Underlying Implicit Cognition in Addiction. In R.W Wiers and A.W Stacy (Eds.) *Handbook of implicit cognition and addiction* (pp. 253-266). California: Sage Publications.
- Department of Health (2013). *2010-2015 government policy: harmful drinking*. [ONLINE] Available at: <https://www.gov.uk/government/publications/2010-to-2015-government-policy-harmful-drinking> (last accessed 17th May, 2015).
- Dickson, J.M., Gately, C., & Field, M. (2013). Alcohol dependent patients have weak negative rather than strong positive implicit alcohol associations. *Psychopharmacology*, *228*, 603-610. doi: 10.1007/s00213-013-3066-0.
- Doumas, D.M., Turrisi, R., & Wright, D.A. (2006). Risk factors for heavy drinking in college freshmen: Athletic status and adult attachment. *Sport Psychologist*, *20*, 419-434.
- Eisenlohr-Moul, T.A., Walsh, E.C., Charnigo, R.J., Lynam, D.R., & Baer, R.A. (2012). The “what” and the “how” of dispositional mindfulness: Using interactions among subscales of the Five-Facet Mindfulness Questionnaire to understand its relation to substance use. *Assessment*, *22*, 65-75. doi: 10.1177/1073191112446658.

- El-Ansari, W., Sebena, R., & Stock, C. (2013). Socio-demographic correlates of six indicators of alcohol consumption: Survey findings of students across seven universities in England, Wales and Northern Ireland. *Archives of Public Health, 71*. doi:10.1186/2049-3258-71-29.
- Elliott, M.A., & Ainsworth, K. (2012). Predicting university undergraduates' binge-drinking behavior: A comparative test of the one- and two-component theories of planned behaviour. *Addictive Behaviors, 37*, 92-101. doi:10.1016/j.addbeh.2011.09.005.
- Feldman, G., Hayes, A., Kumar, S., Greeson, J., & Laurenceau, J. (2007). Mindfulness and emotion regulation: The development and initial validation of the Cognitive and Affective Mindfulness Scale-Revised (CAMS-R). *Journal of Psychopathology and Behavioral Assessment, 29*, 177-190. doi:10.1007/s10862-006-9035-8.
- Fernandez, A. C., Wood, M. D., Stein, L.A. R., & Rossi, J. S. (2010). Measuring mindfulness and examining its relationship with alcohol use and negative consequences. *Psychology of Addictive Behaviors : Journal of the Society of Psychologists in Addictive Behaviors, 24*, 608–616. doi:10.1037/a0021742.
- Field, M., Mogg, K., Zettler, J., & Bradley, B.P. (2004) Attentional biases for alcohol cues in heavy and light social drinkers: the roles of initial orienting and maintained attention. *Psychopharmacology, 176*, 88–93. doi: 10.1007/s00213-004-1855-1.

Field, M., & Cox, W.M. (2008) Attentional bias in addictive behaviors: a review of its development, causes, and consequences. *Drug and Alcohol Dependence*, 97, 1–20. doi: 10.1016/j.drugalcdep.2008.03.030.

Field, M., Kiernan, A., Eastwood, B., & Child, R. (2008). Rapid approach responses to alcohol cues in heavy drinkers. *Journal of Behavior Therapy and Experimental Psychiatry*, 39, 209-218.

Flores, P.J. (2004) *Addiction as an Attachment Disorder*. Jason Aronson: Maryland.

Foster, J.H., & Ferguson, C. (2013). Alcohol ‘pre-loading’: A review of the literature. *Alcohol and Alcoholism*, 49, 213-226. doi: 10.1093/alcalc/agt135.

Francesconi, M., & James, J. (2015). The Cost of Binge Drinking. [ONLINE] Available at: <http://www.bath.ac.uk/economics/research/working-papers/2015-papers/cost-binge-drinking.pdf>. [Last Accessed 26th April 2015].

Fromme, K., Stroot, E.A., & Kaplan, D. (1993). Comprehensive effects of alcohol: Development and psychometric assessment of a new expectancy questionnaire. *Psychological Assessment*, 5, 19-26. doi:10.1037/1040-3590.5.1.19.

Garland, E.L., Boettiger, C.A., Gaylord, S., Chanon, V.W., & Howard, M.O. (2012). Mindfulness is inversely associated with alcohol attentional bias among recovering alcohol-dependent adults. *Cognitive Therapy and Research*, 36, 441-450. doi: 10.1007/s10608-011-9378-7.

- Gill, J.S. (2002). Reported levels of alcohol consumption and binge drinking within the UK undergraduate student population over the last 25 years. *Alcohol and Alcoholism*, 37, 109-120. doi:10.1093/alcalc/37.2.109.
- Goldin, P. R., McRae, K., Ramel, W., & Gross, J. J. (2008). The neural bases of emotion regulation: Reappraisal and suppression of negative emotion. *Biological Psychiatry*, 63, 577–586. doi: 10.1016/j.biopsych.2007.05.031.
- Gray, J. A. (1975). *Elements of a two-process theory of learning*. London: Academic Press.
- Greeley, J.D., Swift, W., & Heather, N. (1993). To drink or not to drink? Assessing conflicting desires in dependent drinkers in treatment. *Drug and Alcohol Dependence*, 32, 169-179. doi:10.1016/0376-8716(93)80010-C.
- Hingson, R., & Howland, J. (1993). Alcohol and non-traffic unintended injuries. *Addiction*, 88, 877-883. doi:10.1111/j.1360-0443.1993.tb02105.x.
- Holt, L. J., Armeli, S., Tennen, H., Austad, C. S., Raskin, S. A., Fallahi, C. R., ... Pearlson, G. D. (2013). A person-centered approach to understanding negative reinforcement drinking among first year college students. *Addictive Behaviors*, 38, 2937–2944. doi:10.1016/j.addbeh.2013.08.015.
- Jones, B.T., & McMahon, J. (1996). A comparison of positive and negative alcohol expectancy and value and their multiplicative composite as predictors of post-

treatment abstinence survivorship. *Addiction*, *91*, 89-99. doi: 10.1046/j.1360-0443.1996.9118911.x.

Jones, B.T., Corbin, W., & Fromme, K. (2001). A review of expectancy theory and alcohol consumption. *Addiction*, *96*, 57-72. doi: 10.1046/j.1360-0443.2001.961575.x.

Kabat-Zinn, J. (1994). *Wherever you go, there you are: Mindfulness meditation in everyday life*. Hyperion.

Kassel, J. D., Wardle, M., & Roberts, J. E. (2007). Adult attachment security and college student substance use. *Addictive Behaviors*, *32*, 1164–76.
doi:10.1016/j.addbeh.2006.08.005.

Katz, E.C., Fromme, K., & D'Amico, E.J. (2000). Effects of outcome expectancies and personality on young adults' illicit drug use, heavy drinking, and risky sexual behavior. *Cognitive Therapy and Research*, *24*, 1-22. doi: 10.1023/A:1005460107337.

Kilbey, M.M., Downey, K., & Breslau, N. (1998). Predicting the emergence and persistence of alcohol dependence in young adults: The role of expectancy and other risk factors. *Experimental and Clinical Psychopharmacology*, *6*, 149-156. doi:10.1037/1064-1297.6.2.149.

Klein, A.A., Stasiewicz, P.R., Koutsky, J.R., Bradizza, C.M., & Coffey, S.F. (2007). A psychometric evaluation of the Approach and Avoidance of Alcohol Questionnaire

(AAAQ) in alcohol dependent outpatients. *Journal of Psychopathology and Behavioral Assessment*, 29, 231-240. doi:10.1007/s10862-007-9044-2.

LaBrie, J. W., Thompson, A. D., Ferraiolo, P., Garcia, J. A., Huchting, K., & Shelesky, K. (2008). The differential impact of relational health on alcohol consumption and consequences in first year college women. *Addictive Behaviors*, 33, 266–78. doi:10.1016/j.addbeh.2007.09.010.

Larimer, M.E., & Cronce, J.M. (2007). Identification, prevention, and treatment revisited: Individual-focused college drinking prevention strategies 1999–2006. *Addictive Behaviors*, 32, 2439–2468. doi:10.1016/j.addbeh.2007.05.006.

Lau-Barraco, C., & Dunn, M.E. (2008). Evaluation of a single-session expectancy challenge intervention to reduce alcohol use among college students. *Psychology of Addictive Behaviors*, 22, 168-175. doi:10.1037/0893-164x.22.2.168.

Lee, N.K., Greely, J., & Oei, T.P.S. (1999). The relationship of positive and negative alcohol expectancies to patterns of consumption of alcohol in social drinkers. *Addictive Behaviors*, 24, 359-369. doi:10.1016/S0306-4603(98)00091-4.

Lee, C.M., Atkins, D.C., Cronce, J.M., Walter, T., & Leigh, B.C. (2015). A daily measure of positive and negative alcohol expectancies and evaluations: Documenting a two-factor structure and within- and between-person variability. *Journal of Studies on Alcohol and Drugs*, 76, 326-335. doi:10.15288/jsad.2015.76.326.

- Leeman, R.F., Toll, B.A., Taylor, L.A., & Volpicelli, J.R. (2009). Alcohol-induced disinhibition expectancies and impaired control as prospective predictors of problem drinking in undergraduates. *Psychology of Addictive Behaviors*, *23*, 553-563. doi:10.1037/a0017129.
- Leigh, B.C., & Stacy, A.W. (2004). Alcohol expectancies and drinking in different age groups. *Addiction*, *99*, 215-227. doi: 10.1111/j.1360-0443.2003.00641.x.
- Leigh, J., & Neighbors, C. (2009). Enhancement motives mediate the positive association between mind/body awareness and college student drinking. *Journal of Social and Clinical Psychology*, *28*, 650–669. doi:10.1521/jscp.2009.28.5.650.
- McEvoy, P.M., Stritzke, W.G.K., French, D.J., Lang, A.R., & Ketterman, R. (2004). Comparison of three models of alcohol craving in young adults: a cross-validation. *Addiction*, *99*, 482-497. doi: 10.1111/j.1360-0443.2004.00714.x.
- McNally, A.M., Palfai, T.P., Levine, R.V., & Moore, B.M. (2003). Attachment dimensions and drinking-related problems among young adults: The mediational role of coping motives. *Addictive Behaviors*, *28*, 1115-1127. doi:10.1016/S0306-4603(02)00224-1.
- McMahon, J., Jones, B.T., & O'Donnell, P. (1994). Comparing positive and negative alcohol expectancies in male and female social drinkers. *Addiction Research*, *1*, 349-365. doi:10.3109/16066359409005202.

Mikulincer, M., Shaver, P.R., & Pereg, D. (2003). Attachment theory and affect regulation: The dynamic, development, and cognitive consequences of attachment-related strategies. *Motivation and Emotion*, *27*, 77-102. doi 10.1023/A:1024515519160.

Mikulincer, M., & Shaver, P.R. (2005). Attachment theory and emotions in close relationships: Exploring the attachment-related dynamics of emotional reactions to relational events. *Personal Relationships*, *12*, 149-168. doi: 10.1111/j.1350-4126.2005.00108.x.

Mikulincer, M., & Shaver, P.R. (2007). Boosting attachment security to promote mental health, prosocial values, and inter-group tolerance. *Psychological Inquiry: An International Journal for the Advancement of Psychological Theory*, *18*, 139-156. doi:10.1080/10478400701512646.

Molnar, D.S., Sadava, S.W., DeCourville, N.H., & Perrier, C.P.K. (2010). Attachment, motivations, and alcohol: Testing a dual-path model of high-risk drinking and adverse consequences in transitional clinical and student samples. *Canadian Journal of Behavioural Science*, *42*, 1-13. doi: 10.1037/a0016759.

NHS Choices (2011). What's your poison? A sober analysis of alcohol and health in the media. [ONLINE] Available at:
http://www.nhs.uk/news/2011/10October/Documents/whats_your_poison_1.0.pdf.
[Last accessed 26th April 2015].

- O'Connor, R.M., & Colder, C.R. (2005). Predicting alcohol patterns in first-year college students through motivational systems and reasons for drinking. *Psychology of Addictive Behaviors, 19*, 10-20. doi:10.1037/0893-164X.19.1.10.
- Ostafin, B.D., Palfai, T.P., & Wechsler, C.E. (2003). The accessibility of motivational tendencies toward alcohol: Approach, avoidance, and disinhibited drinking. *Experimental and Clinical Psychopharmacology, 11*, 294-301. doi:10.1037/1064-1297.11.4.294.
- Ostafin, B. D., & Marlatt, G. A. (2008). Surfing the urge: Experiential acceptance moderates the relation between automatic alcohol motivation and hazardous drinking. *Journal of Social and Clinical Psychology, 27*, 404–418. doi:10.1521/jscp.2008.27.4.404.
- Palfai, T.P., & Ostafin, B.D. (2003) Alcohol-related motivational tendencies in hazardous drinkers: assessing implicit response tendencies using the modified- IAT. *Behaviour Research and Therapy, 41*, 1149–1162. doi:10.1016/S0005-7967(03)00018-4.
- Patrick, M.E., Wray-Lake, L., Finlay, A.K., & Maggs, J.L. (2010). The long arm of expectancies: Adolescent alcohol expectancies predict adult alcohol use. *Alcohol and Alcoholism, 45*, 17-24. doi:10.1093/alcalc/agn066.
- Raes, F., & Williams, M.G. (2010). The relationships between mindfulness and uncontrollability of ruminative thinking. *Mindfulness, 1*, 199-203. doi: 10.1007/s12671-010-0021-6.

Robinson, E., Jones, A., Christiansen, P., & Field, M. (2014). Perceived peer drinking norms and responsible drinking in UK university settings. *Substance Use and Misuse, 49*, 1376-1384. doi: 10.3109/10826084.2014.901390.

Scott-Sheldon, L.A.J., Terry, D.L., Carey, K.B., Garey, L., & Carey, M.P. (2012). Efficacy of expectancy challenge interventions to reduce college student drinking: A meta-analytic review. *Psychology of Addictive Behaviors, 26*, 393-405.
doi:10.1037/a0027565.

Schoenmakers, T., Wiers, R.W., & Field, M. (2008). Effects of a low dose of alcohol on cognitive biases and craving in heavy drinkers. *Psychopharmacology, 197*, 169-178.
doi:10.1007/s00213-007-1023-5.

Shaver, P.R., Lavy, S., Saron, C.D., & Mikuliner, M. (2007). Social foundations of the capacity for mindfulness: An attachment perspective. *Psychological Inquiry: An International Journal for the Advancement of Psychological Theory, 18*, 264-271.
doi:10.1080/10478400701598389.

Standerwick, K., Davies, C., Tucker, L., & Sheron, N. (2007). Binge drinking, sexual behaviour and sexually transmitted infection in the UK. *International Journal of STD & AIDS, 18*, 810-813. doi:10.1258/095646207782717027.

Stein, K.D., Goldman, M.S., & Del Boca, F.K. (2000). The influence of alcohol expectancy priming and mood manipulation on subsequent alcohol consumption. *Journal of Abnormal Psychology, 109*, 106-115. doi:10.1037/0021-843X.109.1.106.

- Taylor, A., & Nestel, P. (2014). The need and opportunities to manage binge drinking among undergraduates at an English university. *Education and Health, 32*, 130-135.
[ONLINE] Available at: <http://sheu.org.uk/x/eh324at.pdf>. (Last accessed 30th May, 2015).
- Theobald, H., Johansson, S.E., Bygren, N.O., & Engfeldt, P. (2001). The effects of alcohol consumption on mortality and morbidity: a 26-year follow-up study. *Journal of Studies on Alcohol, 62*, 783-789. doi:10.15288/jsa.2001.62.783.
- Thorberg, F.A., & Lyvers, M. (2010). Attachment in relation to affect regulation and interpersonal functioning among substance use disorder inpatients. *Addiction Research and Theory, 18*, 464-478. doi: 10.3109/16066350903254783.
- Vinci, C., Peltier, M. R., Shah, S., Kinsaul, J., Waldo, K., McVay, M. A., & Copeland, A. L. (2014). Effects of a brief mindfulness intervention on negative affect and urge to drink among college student drinkers. *Behaviour Research and Therapy, 59*, 82–93. doi:10.1016/j.brat.2014.05.012.
- Wechsler, H., Dowdall, G. W., Davenport, A., & Rimm, E. B. (1995). A gender-specific measure of binge drinking among college students. *American Journal of Public Health, 85*, 982-985. doi:10.2105/AJPH.85.7.982.

- Werner, M.J., Walker, L.S., & Greene, J.W. (1993). Alcohol expectancies, problem drinking, and adverse health consequences. *Journal of Adolescent Health, 14*, 446-452.
doi:10.1016/1054-139X(93)90116-7.
- Wiers, R.W., Rinck, M., Dictus, M., & Van den Wildenburg, E. (2009). Relatively strong automatic appetitive action-tendencies in male carriers of the OPRM1 G-allele. *Genes, brain, and behaviour, 8*, 101-106.
- Wood, M.D., Sher, K.J., & Strathman, A. (1996). Alcohol outcome expectancies and alcohol use and problems. *Journal of Studies on Alcohol, 57*, 283-288.
doi:10.15288/jsa.1996.57.283.
- Wood, M.D., Capone, C., Laforge, R., Erickson, D.J., & Brand, N.H. (2007). Brief motivational intervention and alcohol expectancy challenge with heavy drinking college students: A randomized factorial study. *Addictive Behaviors, 32*, 2509- 2528.
doi:10.1016/j.addbeh.2007.06.018.
- Zamboanga, B. L., Horton, N. J., Leitkowski, L. K., & Wang, S. C. (2006). Do good things come to those who drink? A longitudinal investigation of drinking expectancies and hazardous alcohol use in female college athletes. *Journal of Adolescent Health, 39*, 229–236. doi:10.1016/j.jadohealth.2005.11.019.
- Zgierska, A., Rabago, D., Chawla, N., Kushner, K., Koehler, R., & Marlatt, A. (2009). Mindfulness meditation for substance use disorders: a systematic review. *Substance Abuse, 30*, 266–294. doi: 10.1080/08897070903250019.

Chapter 2

Developing and testing an integrative model of binge drinking behaviour in a student population

Word Count: 4,978

Number of tables: 3

Number of figures: 3

Abstract

Binge drinking (BD) is a pressing social and public health concern in the United Kingdom, especially among university students. Several psychological constructs have been associated with BD behaviour in student populations, including adult attachment style, dispositional mindfulness (DM), alcohol expectancies, and approach motivations. However, as yet, there has been little attempt to study these constructs together in a theoretically-coherent model, which the current study aimed to do. Three hundred and twenty-two students at a UK university in north-west England completed an online questionnaire to assess their drinking behaviour and the psychological constructs of interest. Structural equation modelling results supported a model whereby preoccupied and fearful insecure adult attachment styles predicted an affect-regulation strategy characterised by an inability to be 'non-judgmental' towards, and to 'act with awareness' in relation to internal and external experiences (elements of DM), and lower levels of these DM variables in turn were associated with positive expectancies about the consequences of alcohol use. Strong positive expectancies about drinking alcohol were related to the presence of strong approach motivations towards drinking, which in turn predicted increased BD behaviour. The results are supportive of the proposed integrated model of BD behaviour in students. The model helps to highlight areas where harm-reduction and intervention strategies aimed at reducing BD in students can be targeted.

Introduction

Binge drinking (BD), defined as drinking five or more drinks in a row for men and four or more in a row for women, leading to intoxication (Berridge, Herring, & Thom, 2009) is a pressing concern in the United Kingdom, particularly among student populations (Gill, 2002; NHS Choices, 2011). There are a range of long- and short-term consequences associated with BD behaviour, including increased risk of injuries (Hingson & Howland, 1993), road traffic accidents, unsafe and unwanted sexual contact (Standerwick, Davies, Tucker, & Sheron, 2007), alcohol poisoning (NHS Choices, 2011), and future alcohol dependence (NHS Choices, 2011). Given the potential consequences of BD behaviour, it is important to understand the psychological processes, and the interrelationships between them, that may lead to BD in a student population. Enhanced understanding of these processes in relation to student BD may lead to the development and implementation of more effective harm-reduction measures and/or interventions which may help to lower the risk of future alcohol-related difficulties.

Previous research has associated a range of psychological processes with BD in students, including insecure adult attachment styles (e.g. Kassel, Wardle, & Roberts, 2007), lower levels of dispositional mindfulness (DM) (e.g. Vinci, Peltier, Shah, Kinsaul, Waldo, McVay, *et al*, 2014), positive alcohol expectancies (e.g. Holt, Armeli, Tennen, Austad, Raskin, Fallahi, *et al*, 2013) and self-reported approach motivations (McEvoy, Stritzke, Lang, & Ketterman, 2004). However, these psychological processes have been investigated, for the most part, as relatively separate lines of enquiry. There have been few attempts to study the relationships between them in order to develop a theoretically-coherent and integrated model of BD behaviour.

Insecure attachment styles have been conceptualised in a number of ways, for example Ainsworth and Bell (1970) delineated four attachment-types: secure, insecure-avoidant, insecure-ambivalent/anxious, and insecure-disorganised. Bartholomew and Horowitz (1991) also described four attachment types, including the ‘preoccupied’ dimension, which corresponds to a description of anxious attachment, characterised by a negative view of the self, and a positive view of others. The ‘fearful’ dimension can be seen as a form of avoidant attachment characterised by negative views of the self and others (Bartholomew & Horowitz, 1991). Both ‘preoccupied’ and ‘fearful’ styles have in common a negative view of the self and subsequent low self-esteem, and attachment insecurity characterised by a fear of or expectation of abandonment and rejection by others, both of which have been linked to problematic drinking behaviour by previous research (e.g. Reis, Curtis, & Reid, 2012; Zeigler-Hill, Stubbs, & Madson, 2013).

Additionally, it has been found that people with insecure attachment styles tend to have difficulty regulating negative emotions (Mikulincer & Florian, 1998). For such people, negative affect is likely to be heightened in social situations, where their fears about others and insecurities about themselves may be triggered, and, notably, in students, the majority of BD behaviour takes place in such situations (Foster & Ferguson, 2013). People with an anxious insecure attachment style have been found to display affect regulation strategies characterised by rumination on negative emotions and experiences, and people with an avoidant attachment style display strategies aimed at suppression of negative emotional stimuli (Caldwell & Shaver, 2012). Such strategies are antithetical to a mindful affect regulation strategy characterised by openness, acceptance, and non-judgement of experiences, and, indeed, people with either an anxious or avoidant insecure attachment style have been found to be lower in these elements of DM (Caldwell & Shaver, 2013). Students who are

insecurely attached and students lower in DM have been found to drink more than their securely attached, more mindful counterparts (Doumas, Turrisi, & Wright, 2006; Kassel *et al*, 2007, Fernandez, Wood, Stein, & Rossi, 2010). It is plausible that a lack of effective internal emotion-regulation strategies in students with insecure attachment styles may lead them to search for external means of regulation, which could include the use of alcohol.

It is possible that a reliance on alcohol as an external means of affect regulation, possibly due to a lack of DM as suggested by Leigh and Neighbors (2009), will result in a focus on the positive consequences expected from drinking, and a disregard for the potentially negative outcomes. Indeed, previous research has found that binge drinking students tend to endorse expectancies that alcohol will improve their social and sexual effectiveness and reduce tension, and tend to endorse fewer negative expectancies about the effects of drinking alcohol (see Holt *et al*, 2013). The presence of positive alcohol expectancies has been found to result in increased BD behaviour in student populations (e.g., Bitarello do Amaral, Lourenco, & Ronzani, 2006).

Previous research has found that motivational processes in relation to alcohol involve two distinct and competing inclinations, one to approach and one to avoid the desired substance (Breiner, Stritzke, & Lang, 1999). Thus, a person can have a combination of high and low approach and avoidance motivational tendencies toward alcohol. Indeed, alcohol dependent samples have reported high levels of approach and avoidance motivations simultaneously, indicating ambivalence about whether to use alcohol or not (Barkby, Dickson, Roper, & Field, 2011). People tend to be motivated towards things that are expected to bring them positive gain. As such, the presence of positive alcohol expectancies could plausibly account for the increased approach motivations towards drinking that tend to be seen in student

populations (McEvoy *et al*, 2004). Indeed, O'Connor and Colder (2005) found that students with strong self-reported approach motivations and positive alcohol expectancies are more likely to fall into a group displaying BD behaviour.

This current study proposed a model whereby insecure attachment styles may lead to difficulty regulating difficult emotions, which for students with an insecure attachment may be most strongly activated in social situations, resulting in a search for external methods of regulation. Students with the expectation that alcohol will help them manage their emotions may hold other positive expectancies about the consequences of drinking alcohol, which in turn could increase their approach inclinations towards drinking, resulting in higher levels of BD (see Figure 1 below). Research has already provided preliminary support for the central portion of this model; Leigh and Neighbors (2009) found that positive alcohol expectancies mediated the relationship between DM and drinking behaviour in students. However, this study did not explore the potential precursors to low DM, and also neglected the literature on the role of approach motivations in drinking behaviour. Similarly, Molnar, Sadava, DeCourville and Perrier (2010) found support for an association between insecure attachment styles and positive expectancies about the efficacy of alcohol to improve social facilitation and the ability to cope with tension, but did not explore why some people may be more likely to hold these positive expectancies to begin with. The proposed model remedies these limitations, integrating these two models with attachment theory in relation to affect regulation and motivational theory.

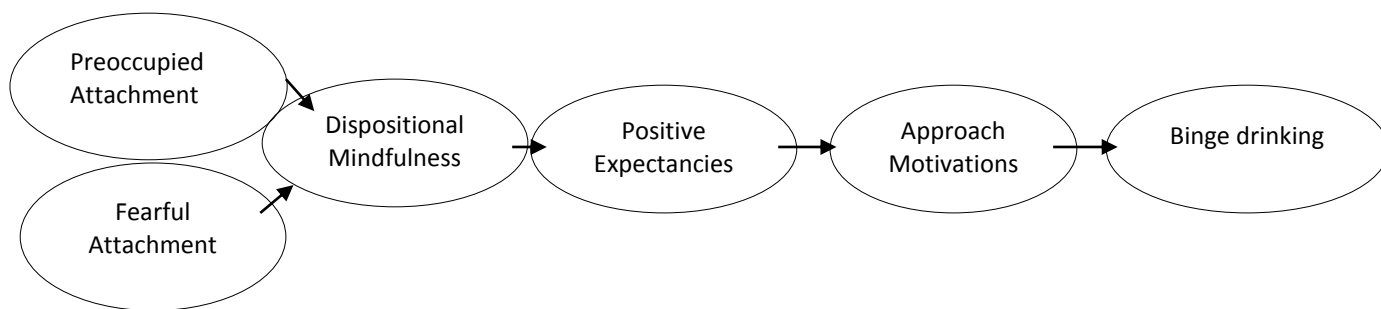


Figure 1: Visual representation of the proposed relationships between the psychological processes of interest in relation to binge drinking

In summary, past research has supported a theoretically-coherent pathway through the multiple variables associated with BD behaviour. The aim of this study was to test this model in a student sample.

Method

Participants

A non-clinical sample of students was recruited from a large university in the north-west of England between February 2014 and January 2015. Inclusion criteria were: 1) being an undergraduate or postgraduate student at the university, 2) being fluent in English, and 3) having access to a computer. Four hundred and five participants accessed the online questionnaire. Of these, 83 participants (23%) did not complete any of the questionnaire and as such were excluded from the final analysis. The questionnaire was designed so that participants could not miss items and they were prompted if they did so. The remaining participants completed the full questionnaire, giving a completion rate of 77%, which is roughly equivalent to completion rates in other studies using face-to-face or online surveys (Denscombe, 2006). The total sample comprised 322 participants (29.5% male, 70.5% female).

The majority of participants fell within the 18-23 age range (74%). Undergraduates in their third year of study made up 26.1% of the sample, 24.8% were undergraduates in their first year, 18.9% were in their second year, 16.1% were postgraduates, and a further 14% were involved in other years of undergraduate study (e.g. longer degrees such as medicine). The total mean score on the AUDIT was 8.77 ($SD=5.82$). Of the participants, 37.3% did not score in the range indicative of BD behaviour, around 56.5% fell into a range indicative of BD and a further 6.2% reported drinking that may be indicative of dependency (Babor, Higgins-Biddle, Saunders, & Monteiro, 2001) (more information about using the AUDIT to measure BD is presented in the following section).

Measures

Alcohol Use Disorders Identification Test (AUDIT; Babor *et al*, 2001)

BD behaviour was assessed using the AUDIT. The AUDIT is a ten-item self-report questionnaire measuring alcohol consumption, alcohol dependence, and alcohol-related difficulties. The questionnaire is scored from 0 to 36. Scores of eight or more in men and seven or more in women indicate hazardous drinking behaviour, while a score of 20 or more may indicate alcohol dependence (Babor *et al*, 2001). One validation study reported good internal reliability ($\alpha=.86$) and test-retest reliability ($\alpha=.90$) (Babor *et al*, 2001). In the current sample, the internal consistency of the measure was found to be good ($\alpha=.82$)

In a general adult population, total scores above seven/eight on the AUDIT in males, and above five in females, were found to provide the optimal combinations of sensitivity and

specificity indicative of BD (Aalto, Alho, Halme, & Seppa, 2009). Using these cut-offs, mean scores on the AUDIT in this sample (for males, $M=8.91$, $SD=6.32$, for females, $M=8.72$, $SD=5.62$) indicated that a large proportion were displaying a pattern of consumption that could be considered BD.

The Relationships Questionnaire (RQ; Bartholomew & Horowitz, 1991)

Attachment style was measured using the RQ. This measure conceptualises one's attachment style as including both a concept of the self and of others as either positive or negative. The measure consists of four paragraphs, each describing an attitude toward relationships, which approximate to one of four attachment styles: secure, preoccupied, fearful and dismissive. As described in the introduction to this paper, the 'preoccupied' dimension from this scale can be conceptualised as a form of anxious attachment and the 'fearful' dimension as a form of avoidant attachment (Bartholomew & Horowitz, 1991) and only these scales were used in the final model. Research has suggested that the validity and reliability of the RQ is acceptable when it is used to assess attachment style as a dimensional variable, which is how it was used in the current study (Griffin & Bartholomew, 1994).

The Comprehensive Effects of Alcohol (CEOA; Fromme, Stroot & Kaplan, 1993) questionnaire

Alcohol expectations were measured using the CEOA questionnaire. This is a 38-item measure that assesses expectancies concerning the consequences of drinking alcohol. It provides scores on seven scales: four positive expectancies (Sociability, Tension Reduction, Liquid Courage, Sexuality) and three negative expectancies (Cognitive and Behavioural Impairment, Risk and Aggression, Self-Perception). Only the positive expectancy scales were included in the model, as previous research has linked these to higher rates of BD. The

CEOA has been found to have good reliability and validity (e.g. Ham, Stewart, Norton, & Hope, 2005). In the current sample, the internal consistency of each scale was found to be generally acceptable (Sociability ($\alpha=.85$), Tension Reduction ($\alpha=.69$), Liquid Courage ($\alpha=.81$), Sexuality ($\alpha = .73$).

Five Facet Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006)

Mindfulness was measured using the FFMQ, which is a 39-item instrument based on a factor-analytic study of five independently developed mindfulness questionnaires. The five facets measured are: observing, describing, acting with awareness, non-judging of inner experience, and non-reactivity to inner experience. One study of the psychometric properties of the FFMQ (Baer *et al*, 2006) found that the five factors display adequate to good internal consistency (e.g. Non-reactivity $\alpha = 0.75$ and Describing $\alpha = 0.91$). In the current sample, the internal consistency of each scale was found to be acceptable (Observe ($\alpha=.76$), Describe ($\alpha=.91$), Non-judge ($\alpha=.92$), Non-react ($\alpha=.80$), Awareness ($\alpha=.87$). Only the Non-judging and Acting with Awareness subscales are used in the current study because past research points to lower levels of these two factors being linked to increased frequency of BD in student populations (Eisenlohr-Moul, Walsh, Charnigo, Lynam, & Baer, 2012). Research suggests that the five factors of the FFMQ affect drinking behaviour to different degrees and in different ways, and therefore DM cannot be seen as a unitary concept (Eisenlohr-Moul *et al*, 2012).

The Approach and Avoidance of Alcohol Questionnaire (AAAQ; McEvoy *et al*, 2004)

Approach and avoidance motivational tendencies towards alcohol were assessed using the AAAQ, which assesses mild to moderate inclinations to drink, as well as inclinations to avoid drinking. This study used a 14-item version of the scale, which has been validated previously with two university student samples (McEvoy *et al*, 2004). The items measure mild ('inclined/indulgent') and strong ('obsessed/compelled') forms of alcohol approach motivation, and alcohol avoidance motivation ('resolved/regulated'). In the current sample, the internal consistency of each scale was found to be acceptable (Inclined/Indulgent ($\alpha=.85$), Obsessed/Compelled ($\alpha=.83$), and Resolved/Regulated ($\alpha=.72$)).

Procedure

This was a cross-sectional internet-based study. Institutional and ethical approval was obtained from the University of Liverpool (Ref: IPHS-1314-LB-214,). The study was advertised on the digital announcements of the university's homepage. In addition, with the approval of heads of departments at the university, the link to the questionnaire was disseminated by departmental administrative staff to students. When participants followed the link they were taken to a webpage containing the participant information sheet and consent form. Participants were required to complete the consent form before they could access the questionnaire.

Questions about demographic information (gender, age, year of study) were presented first, followed by the questionnaires presented in the following order: AUDIT, RQ, CEOA, FFMQ, and AAAQ. In total, participation time was approximately 20 minutes.

Analysis

SPSS 21 was used to manage and screen the questionnaire data and complete the preliminary analyses. SEM was used to test the proposed theoretical model using Mplus version 7.2 (Muthén & Muthén, 1998-2012). Due to skewness in some variables (e.g., total AUDIT scores) robust Maximum Likelihood (MLR) estimation was used. The use of MLR corrects for the effects of non-normality in the observed variables (Kline, 2013). (Appendix A for more details about data preparation, screening and SEM analysis).

Model fit was assessed using a range of fit statistics. The root-mean-square error of approximation (RMSEA: Steiger, 1990), the standardized root-mean-square residual (SRMR) and the comparative fit index (CFI; Bentler, 1990) were used. A CFI value above .90 indicates reasonable fit (Hu & Bentler, 1999). For the RMSEA and SRMR values less than .05 indicate good fit; however values less than .08 also suggest adequate fit (Hu & Bentler, 1999).

Based on recommendations, the minimum sample size for a SEM analysis is at least 10 participants per parameter to be estimated (Schreiber, Nora, Stage, Barlow, & King, 2006). The final model following modification presented in this paper has 27 parameters (14 regression weights, 11 error variances, two covariances) indicating a minimum sample size of 270. The total sample size of 322 indicates that the analysis was adequately powered.

Results

Descriptive Statistics

Mean descriptive statistics for key study variables are included in Table 2. Females generally scored higher on the Fearful and Preoccupied attachment dimensions, $t(158) = -3.67, p < .01$ and $t(320) = -2.36, p < .05$ respectively. Females were also more likely to hold positive expectancies that alcohol would enhance sexual experiences, $t(320) = -2.35, p < .05$. Males were more likely to score highly on the 'Act with Awareness' subscale of the FFMQ, $t(320) = 2.73, p < .01$.

Table 2: Descriptive Statistics

Variable	Mean	Standard Deviation	Minimum-Maximum Score Range
AUDIT	8.77	5.82	0-29
Fearful	3.91	1.85	1-7
Preoccupied	3.38	1.78	1-7
SocEx	26.4	4.14	8-33
SexEx	9.34	2.80	4-16
TensRedEx	7.66	1.95	3-12
LCEX	12.5	3.29	5-20
Nonjudge	24.7	7.41	8-40
Awareness	24.3	5.64	11-40
IncInd	4.86	2.14	.00-8.00
ObsCom	1.02	1.46	.00-6.25

Note: AUDIT= Total AUDIT score; Fearful = Fearful attachment dimension (RQ); Preoccupied= Preoccupied attachment dimension (RQ); SocEx = Sociability (CEOA); SexEx= Sexuality (CEOA); TensRedEx = Tension Reduction (CEOA); LCEX = Liquid Courage (CEOA); Nonjudge = Non-Judgement (FFMQ); Awareness = Act with Awareness (FFMQ); IncInd = Inclined/Indulgent (AAAQ); ObsCom = Obsessed/Compelled (AAAQ).

Correlations

Pearson's correlations were calculated for all pairs of variables and are reported in Table 2.

Both Preoccupied and Fearful attachment dimensions were significantly correlated with positive alcohol expectancies, less ability to be non-judging of internal and external experience, and to act with awareness, as predicted. Both FFMQ variables were negatively correlated with positive alcohol expectancies, suggesting that someone scoring lower on the ability to act with awareness or be non-judging of their experiences would hold stronger positive alcohol expectancies and vice versa, as predicted. As predicted, positive alcohol expectancies were positively correlated with both mild and strong approach motivations towards alcohol. Total scores on the AUDIT were positively correlated with three of the four

positive alcohol expectancies, both mild and strong approach motivations, and negatively correlated with both FFMQ variables.

Table 3: Correlation Matrix of Study Variables

Variable	1	2	3	4	5	6	7	8	9	10
Total AUDIT										
Fearful Attachment	.05									
Preoccupied Attachment	.04	.13*								
Sociability Expectancy	.32**	-.00	.13*							
Sexuality Expectancy	.25**	.12*	.15**	.37**						
Tension Reduction Ex	.09	.12*	-.02	.27**	.35**					
Liquid Courage Ex	.26**	.03	.06	.46**	.53**	.37**				
Non-judgement	-.12*	-.29**	-.28**	-.14*	-.16**	-.12*	-.19**			
Act with Awareness	-.22**	-.22**	-.19**	-.21**	-.23**	-.14**	-.22**	.42**		
Inclined/Indulgent	.59**	-.01	.07	.36**	.28**	.20*	.22**	-.07	-.19**	
Obsessed/Compelled	.50**	.07	.05	.19**	.36**	.26	.31**	-.19**	-.24**	.53**

*Significant at .05 level, two-tailed, ** Significant at .01 level.

SEM Analysis

SEM was used to test a hypothesised model whereby Preoccupied and Fearful attachment styles led to lower levels of the two FFMQ subscales, resulting in higher scores on a latent variable representing positive alcohol expectancies. This in turn was expected to lead to higher scores on an approach motivation latent variable, resulting in higher scores on the AUDIT. (See Figure 2).

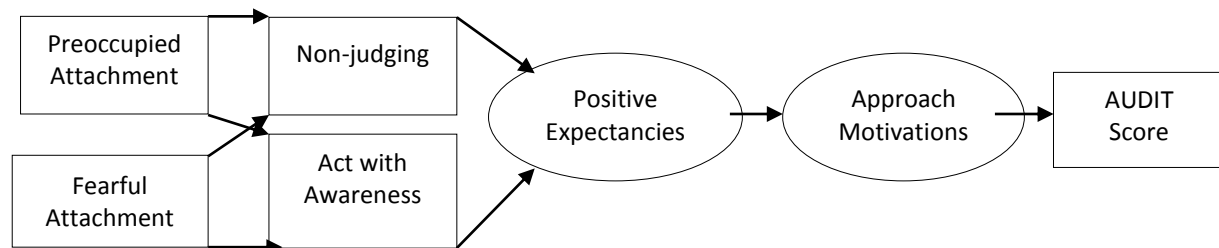


Figure 2: Visual representation of the initial model

Note: Variables presented in rectangles are observed variables (e.g. Preoccupied and Fearful attachment from the RQ, Non-Judging and Act with Awareness from the FFMQ and total AUDIT score). The ovals represent latent variables, which are described in more detail below

Measurement Model

Prior to testing the initial model, a measurement model was tested to assess the fit of the two latent variables (Positive Expectancies and Approach Motivations) and whether the observed indicators loaded adequately onto them. The ‘Positive Expectancies’ latent variable included Sociability, Sexuality, Tension Reduction, and Liquid Courage subscales of the CEOA as indicators, whilst the Inclined/Indulgent and Obsessed/Compelled subscales of the AAAQ acted as indicators for the Approach Motivations latent variable. A Robust Maximum Likelihood method was used to estimate the parameters of the measurement model based upon the data covariance matrix, CFI=0.99, RMSEA =0.04, SRMR = 0.02. All fit indices suggested that the proposed measurement model was a good fit to the data. All factor loadings were above .4, suggesting the indicators loaded well onto the underlying factors (Costello & Osborne, 2005). Initially, a Mindfulness latent variable was also proposed made

up of the five FFMQ subscales. However, when modelling was attempted, the items did not converge, suggesting that they did not load on to a single factor that could be described as ‘mindfulness’.

Initial Model

The initial proposed model was then tested, resulting in the following fit statistics: CFI=0.90, RMSEA = 0.07, SRMR =0.05. Examination of the fit indices revealed that the model was a moderately good fit to the data but could be improved.

Model Modification

Modification indices highlighted a number of changes that could be made to improve the model. Any modifications accepted needed to be theory-driven to avoid simply over-fitting the model to the data and reducing generalisability. The modification indices suggested adding a correlation between the error terms of the Sociability and the Inclined/Indulgent subscales. This change appeared to be theoretically coherent; both the Sociability subscale of the CEOA and Inclined/Indulgent subscale of the AAAQ focus heavily on questions related to drinking in social situations, which may explain a correlation between the two. A correlation between the error terms of the two FFMQ variables was also suggested. A certain degree of residual covariation between these variables is expected since they both assess mindful traits, and so this correlation was added. Neither modification significantly altered the original hypotheses regarding the relationships between the variables. With these modifications made, the final fit indices for the model were, CFI = 0.96, RMSEA = 0.05, SRMR = 0.03. The initial and modified models were compared: $\Delta X^2 (2) = 43.02, p < 0.05$, suggesting that the modified model was a significantly better fit to the data than the initial model (<https://www.statmodel.com/chidiff.shtml>). The final model complete with

standardised regression weights, associated significance values and R^2 values are reported in Figure 3.

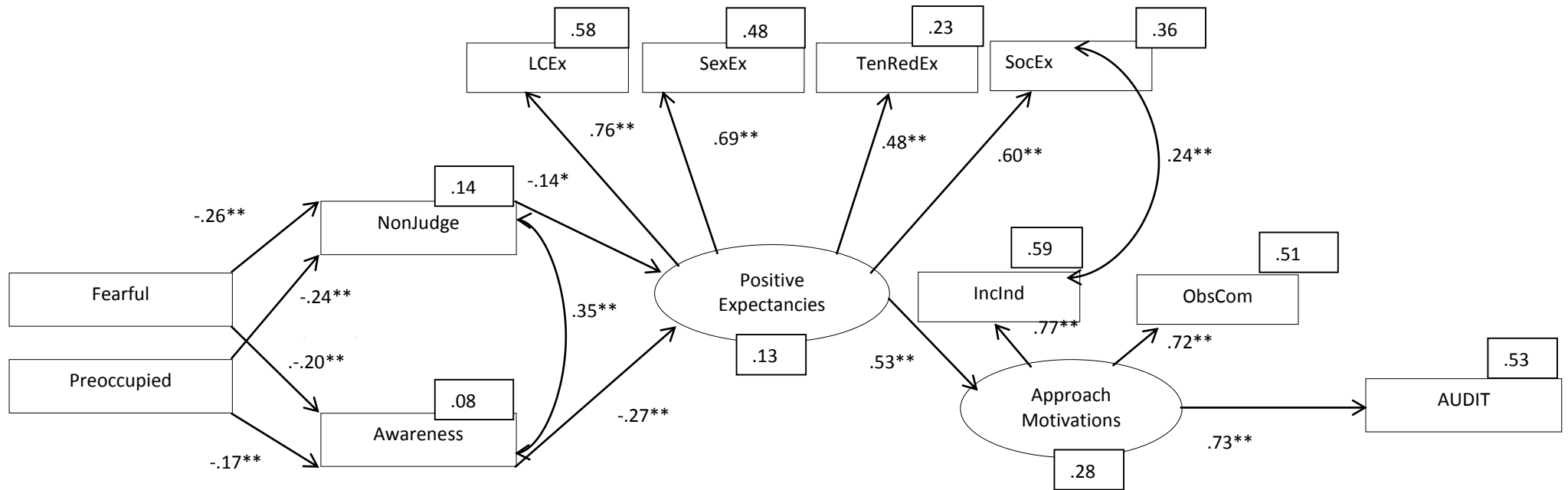


Figure 3: Graphical representation of the final model

Note: Standardised regression slopes are represented by single-headed arrows and covariance between variables is represented by double-headed arrows. The total standardised proportion of variance accounted for (R^2) is reported to the top right corner of each endogenous variable, and at the bottom of the two latent variables.

AUDIT= Total AUDIT score; Fearful = Fearful attachment dimension (RQ); Preoccupied= Preoccupied attachment dimension (RQ); SocEx = Sociability (CEOA); SexEx= Sexuality (CEOA); TenRedEx = Tension Reduction (CEOA); LCEx = Liquid Courage (CEOA); NonJudge = Non-judgement (FFMQ); Awareness = Act with Awareness (FFMQ); IncInd = Inclined/Indulgent (AAAQ); ObsCom = Obsessed/Compelled (AAAQ).

**Significant at the .001 level.

*Significant at the .05 level.

Indirect Effects

The unstandardised indirect effects are reported in Table 3. Calculating indirect effects allows us to analyse mediation relationships between variables. In the final model there were significant pathways between Fearful attachment style and Preoccupied attachment style and positive alcohol expectancies through the ‘Act with Awareness’ mindfulness variable, but not through the ‘Non-judging’ mindfulness variable. A similar pattern was found in the pathways between Fearful and Preoccupied attachment and AUDIT scores, which again were significant through ‘Act with Awareness’ but not ‘Non-judging’. Finally, there was a significant pathway between positive expectancies and AUDIT scores through approach motivations to alcohol.

Adding in further direct pathways from the Positive Expectancies latent variable and the two FFMQ subscales to AUDIT scores did not significantly improve the model, $\Delta X^2(1) = 0.40$, $p = 0.53$ (added pathway from Positive Expectancies to AUDIT), $\Delta X^2(2) = 1.08$, $p = 0.58$ (added pathway from FFMQ subscales to AUDIT).

(<https://www.statmodel.com/chidiff.shtml>).

Table 4: Unstandardised indirect effects for the final model

Predictor	Outcome	Total Indirect Effect	Lower CI	Upper CI	Mediators (specific indirect effects)
Fearful	Positive Expectancies	.12**	.80	.16	Awareness (.07**)
					Non-judging (.05)
Preoccupied	Positive Expectancies	.12**	.08	.16	Awareness (.07**)
					Non-judging (.05)
Positive Expectancies	AUDIT	.89**	.74	1.04	Approach (.89**)
Fearful	AUDIT	.11**	.07	.15	Awareness (.07**)
					Non-judging (.04)
Preoccupied	AUDIT	.10**	.06	.14	Awareness (.06*)
					Non-judging (.04)

**Significant at .01 level two- tailed, * Significant at .05 level two-tailed

Discussion

This study proposed an integrated theoretical model of BD behaviour in students, drawing together key psychological constructs found to predict student BD. Being higher on Preoccupied/anxious and Fearful/avoidant attachment style dimensions significantly predicted lower levels of both DM variables. Lower levels of DM traits significantly predicted the endorsement of positive alcohol expectancies. In turn, stronger positive alcohol expectancies significantly predicted higher levels of both mild and more compulsive approach motivations towards drinking. Finally, there was a significant pathway from approach motivations towards increased BD behaviour. These findings lend tentative support to the hypothesised model. Thus, the results provide initial evidence of a potential psychosocial pathway emerging from insecure adult attachment style to lower ability to be

non-judgmental of and act with awareness towards one's experiences, through to positive alcohol expectancies and approach motivations, which in turn predicted BD behaviour.

This study found that students with preoccupied and fearful adult attachment styles displayed lower abilities on two DM traits; to be non-judgemental towards and to act with awareness in relation to experiences. These findings are supportive of previous research indicating that people with insecure attachment styles tend to display ineffective emotion regulation strategies antithetical to a mindful, non-judgemental and non-reactive response to experiences (Zgierska *et al*, 2009). The current findings extend the results of other studies investigating mediating relationships between these variables (e.g. Leigh & Neighbours, 2009; Molnar *et al*, 2010). The findings highlight that attachment insecurity may be a precursor to the development of less effective emotion regulation strategies in the form of lower DM abilities, and that in turn a lack of effective internal regulation strategies may be a precursor to the development of positive alcohol expectancies.

This study found that lower levels of DM abilities were predictive of positive expectancies about the consequences of drinking alcohol; in particular, expectancies that alcohol will increase social and sexual effectiveness. This finding supports past research which has shown that positive alcohol expectancies are associated with increased BD (e.g. Holt *et al*, 2013). It is also supportive of Leigh and Neighbors's (2009) finding that positive alcohol expectancies mediated the relationship between DM and drinking behaviour in students. The current findings extend our knowledge by suggesting that students who struggle to regulate their own emotions using internal strategies are likely to hold positive expectations about the consequences of drinking, particularly in relation to how alcohol may help them cope more effectively with social situations and manage difficult emotions. Conceivably, these students

may well be most susceptible to messages that aim to foster positive expectancies (e.g. advertisements linking drinking behaviour to popularity or attractiveness) (Zamboanga *et al*, 2006; Holt *et al*, 2013). Furthermore, the present findings extend the work of Zamboanga *et al* (2006) and Holt *et al* (2013) by suggesting that the relationship between positive expectancies and BD may be mediated by strong approach motivations towards alcohol, which was the strongest direct predictor of BD behaviour.

The current finding that students display strong approach motivations (both mild and more compulsive) towards alcohol is consistent with previous research conducted using US and Australian student samples (McEvoy *et al*, 2004). Consistent with motivational models of drinking, this finding suggests that there is an 'evaluative space' wherein a person decides whether or not to drink based on the level of reinforcement they expect to receive from the behaviour (Cox & Clinger, 1988). Indeed, O'Connor and Colder (2005) found that students who displayed the heaviest episodic drinking also displayed strong approach motivations and endorsed positive expectancies that alcohol would improve social functioning and help them cope with difficult experiences.

Methodological Considerations

Some study limitations merit comment. Firstly, although SEM is used to test theoretically-defined causal models, the data in this study is cross-sectional, so the direction of the effects cannot be inferred. For example, it may be that higher BD levels actually predict stronger approach motivations and positive expectancies due to people having positive experiences when they drink, which impacts on their cognitions about and motivations towards alcohol. Nevertheless, the model and the predictive pathways specified within the model are generally consistent with the existing empirical and theoretical literature, and suggest a more

comprehensive understanding of the pathway from attachment style, cognition, and motivational variables through to BD behaviour. To make causal inferences, longitudinal and experimental studies are warranted. For example, trials of mindfulness interventions could be designed to equip people with better affect-regulation abilities, which in turn might reduce their need for external regulation strategies and reduce positive alcohol expectancies. Pre- and post-intervention comparisons could assess whether such interventions did indeed have any impact on drinking behaviour or alcohol expectancies.

Secondly, limited demographic data was collected, with the aim of reducing participation time in the study. Information was collected about gender, age, and year of study. However, no information was collected about ethnicity, previous meditation experience (which may have impacted on FFMQ scores), or previous treatment for alcohol-related difficulties. Past research has found that there may be cultural differences in terms of the acceptability of drinking, and of particular drinking patterns, and the collection of further demographic information would help to elucidate these differences (e.g. McEvoy *et al*, 2004; Bitarello do Amaral *et al*, 2006). Furthermore, no attempt was made to exclude teetotallers or students receiving treatment for alcohol abuse. This was partially in an attempt to gain as diverse a sample of the population as possible, as previous studies have tended to draw participants from a very small section of the student population (e.g. all women, athletes, or first-year undergraduates).

Finally, a criticism of previous research looking at each psychological process included in the model was that samples tended to be relatively homogenous thus potentially limiting generalisability of the findings to the student population as a whole. Although the current study attempted to collect data from across the student population the majority of participants

were female undergraduates between the ages of 18-23. It may be that younger females are more likely to access and complete online questionnaires for some reason. Further research may need to utilise other methods of advertising or data collection to access other portions of the student population.

Future research and clinical implications

Given that a large proportion of this sample was consuming alcohol in a pattern that could be described as BD, and given the possible short- and long-term consequences of this pattern of drinking, it is clear that alcohol-use amongst student populations should remain firmly on the research agenda. This should include a focus on both the predictors and risk factors for problematic alcohol use, and on the targeting and development of harm-reduction and intervention strategies. The present study and the model may help in the organisation of future research in these areas, and research utilising longitudinal experimental methods would be useful to investigate the causal relationships hypothesised in the model.

The present study has several potential implications for clinical practice and harm-reduction strategies that could be utilised by universities to reduce BD and its detrimental consequences. For instance, this study found that the strongest single predictor of BD behaviour was approach motivations towards alcohol. Harm-reduction or education strategies aimed at reducing approach motivations, or strengthening avoidance motivations should be explored. With regards to strengthening avoidance motivation, it is likely that this will require wider changes in the culture of drinking and socialising on university campuses. Increasing the options for and attractiveness of alcohol-free social events on campuses, or reducing the focus on the link between alcohol use and socialising (e.g. limiting the promotion of 'bar crawls' and the provision of alcoholic drinks vouchers for local bars in

Fresher's Week), may create an environment in which it is easier and more socially acceptable to avoid, or reduce, alcohol use. Furthermore, given that the presence of positive alcohol expectancies may give rise to strong approach motivations, advertising strategies aimed at modifying positive alcohol expectancies, or increasing negative expectancies, may have some impact on reducing approach motivations (see Larimer & Cronce, 2007; Hutton, 2012; Wolfson *et al*, 2012 for further examples of harm-reduction strategies).

Finally, given the finding that both anxious and avoidant styles of adult attachment may indirectly lead to BD, harm-reduction strategies aimed at improving opportunities for social connection amongst students which do not necessarily involve a focus on heavy alcohol use may help to create social situations where people feel comfortable and more able to form connections with others without resorting to external means of emotion regulation. A focus on the development and efficacy of harm-reduction strategies on university campuses should be a key area for future research.

Additionally, this research could help with guiding and developing personalised interventions for students who do present to services. Given the finding that a high proportion of the current sample were displaying BD behaviour, and the link between this and later alcohol dependence, practitioners providing mental health and other support services to student populations should consider including an assessment of alcohol-use as part of the wider assessment of a service user's difficulties. If individual intervention was then deemed appropriate, this could include the utilisation of techniques aimed at developing mindfulness or other affect-regulation strategies or modifying alcohol expectancies (Vinci *et al*, 2010; Scott-Sheldon, Terry, Carey, Garey, & Carey, 2012), both of which have already had successful outcomes in this population.

Conclusion

This study found support for a more theoretically integrated model of BD in students, suggesting a potential psychosocial pathway from insecure adult attachment styles, leading to difficulties in affect regulation. This in turn predicted increased positive expectancies about drinking and increased approach motivations towards drinking, which lead to increased BD. Although the present study extends the understanding of the psychological processes leading to BD behaviour in students, longitudinal and experimental research is needed to investigate the causal relationships hypothesised here. The findings highlight potential avenues for the development of more effective harm-reduction and intervention strategies that could most usefully be targeted in this population.

References

- Aalto, M., Alho, H., Halme, J.T., & Seppa, K. (2009). AUDIT and its abbreviated versions in detecting heavy and binge drinking in a general population survey. *Drug and Alcohol Dependence*, 103, 25-29. doi: 10.1016/j.drugalcdep.2009.02.013.
- Babor T.F., Higgins-Biddle J.C., Saunders J.B., & Monteiro M.G. (2001). *The Alcohol Use Disorders Identification Test, Guidelines for Use in Primary Care* (2nd Edition). Department of Mental Health and Substance Dependence, World Health Organization.
- Baer, R.A., Smith, G.T., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report assessment methods to explore facets of mindfulness. *Assessment*, 13, 27-45. doi:10.1177/1073191105283504.
- Barkby, H., Dickson, J.M., Roper, L., & Field, M. (2011). To approach or avoid alcohol? Automatic and self-reported motivational tendencies in alcohol dependence. *Alcoholism: Clinical and Experimental Research*, 36, 361-368. doi:10.1111/j.1530-0277.2011.01620.x.
- Bartholomew, K. & Horowitz, L. M. (1991). Attachment styles among young adults: A test of a four category model. *Journal of Personality and Social Psychology*, 61, 226-244. doi: 10.1037/0022-3514.61.2.226.

- Bentler, P.M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin*, *107*, 238-246. doi:10.1037/0033-2909.107.2.238.
- Berridge, V., Herring, R., & Thom, B. (2009). Binge Drinking: A Confused Concept and its Contemporary History. *Social History of Medicine*, October 2009, pp.1-11. doi: 10.1093/shm/hkp053.
- Bitarello do Amaral, M., Lourenço, L. M., & Ronzani, T. M. (2006). Beliefs about alcohol use among university students. *Journal of Substance Abuse Treatment*, *31*, 181–185. doi:10.1016/j.jsat.2006.04.004.
- Bowlby, J. (1969). *Attachment and loss, Vol. 1: Attachment*. New York: Basic Books.
- Breiner, M.J., Stritzke, W.G.K., & Lang, A.R. (1999). Approaching avoidance: A step essential to the understanding of craving. *Alcohol Research and Health*, *23*, 197-206.
- Caldwell, J.G., & Shaver, P.R. (2012). Exploring the cognitive-emotional pathways between adult attachment and ego-resiliency. *Individual Differences Research*, *10*, 141-152.
- Caldwell, J. G., & Shaver, P. R. (2013). Mediators of the Link between Adult Attachment and Mindfulness. *Interpersona: An International Journal on Personal Relationships*, *7*, 299–310. doi:10.5964/ijpr.v7i2.133.
- Chi-Square Difference Testing Using the Satorra-Bentler Scaled Chi-Square. (n.d.). Retrieved May 30, 2015, from <https://www.statmodel.com/chidiff.shtml>.

- Cox, W.M., & Klinger, E. (1988). A motivational model of alcohol use. *Journal of Abnormal Psychology, 97*, 168-180. doi:10.1037/0021-843x.97.2.168.
- Denscombe, M. (2006). Web-based questionnaires and the mode effect - An evaluation based on completion rates and data contents of near-identical questionnaires delivered in different modes. *Social Science Computer Review, 24*, 246-254. doi: 10.1177/0894439305284522.
- Doumas, D.M., Turrisi, R., & Wright, D.A. (2006). Risk factors for heavy drinking in college freshmen: Athletic status and adult attachment. *Sport Psychologist, 20*, 419-434.
- Fernandez, A. C., Wood, M. D., Stein, L.A. R., & Rossi, J. S. (2010). Measuring mindfulness and examining its relationship with alcohol use and negative consequences. *Psychology of Addictive Behaviors : Journal of the Society of Psychologists in Addictive Behaviors, 24*, 608–616. doi:10.1037/a0021742.
- Foster, J.H., & Ferguson, C. (2013). Alcohol ‘pre-loading’: A review of the literature. *Alcohol and Alcoholism, 49*, 213-226. doi: 10.1093/alcalc/agt135.
- Fromme, K., Stroot, E.A., & Kaplan, D. (1993). Comprehensive effects of alcohol: Development and psychometric assessment of a new expectancy questionnaire. *Psychological Assessment, 5*, 19-26. doi:10.1037/1040-3590.5.1.19.

- Gill, J.S. (2002). Reported levels of alcohol consumption and binge drinking within the UK undergraduate student population over the last 25 years. *Alcohol and Alcoholism*, 37, 109-120. doi:10.1093/alcalc/37.2.109.
- Griffin, D.W., & Bartholomew, K. (1994). Models of the self and other: Fundamental dimensions underlying measures of adult attachment. *Journal of Personality and Social Psychology*, 67, 430-445. doi: 10.1037/0022-3514.67.3.430.
- Eisenlohr-Moul, T.A., Walsh, E.C., Charnigo, R.J., Lynam, D.R., & Baer, R.A. (2012). The “what” and the “how” of dispositional mindfulness: Using interactions among subscales of the Five-Facet Mindfulness Questionnaire to understand its relation to substance use. *Assessment*, 22, 65-75. doi: 10.1177/1073191112446658.
- Ham, L. S., Stewart, S. H., Norton, P. J., & Hope, D. A. (2005). Psychometric assessment of the Comprehensive Effects of Alcohol Questionnaire: Comparing a brief version to the original full scale. *Journal of Personality and Behavioral Assessment*, 27, 141-158. doi: 10.1007/s10862-005-0631-9.
- Hingson, R., & Howland, J. (1993). Alcohol and non-traffic unintended injuries. *Addiction*, 88, 877-883. doi:10.1111/j.1360-0443.1993.tb02105.x.
- Holt, L. J., Armeli, S., Tennen, H., Austad, C. S., Raskin, S. A., Fallahi, C. R., ... Pearlson, G. D. (2013). A person-centered approach to understanding negative reinforcement drinking among first year college students. *Addictive Behaviors*, 38, 2937–2944. doi:10.1016/j.addbeh.2013.08.015.

- Hu, L., & Bentler, P.M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, 6, 1-55. doi: 10.1080/10705519909540118.
- Hutton, F. (2012). Harm reduction, students and pleasure: An examination of student responses to a binge drinking campaign. *The International Journal on Drug Policy*, 23, 229-235. doi: 10.1016/j.drugpo.2011.10.001.
- Kassel, J. D., Wardle, M., & Roberts, J. E. (2007). Adult attachment security and college student substance use. *Addictive Behaviors*, 32, 1164–76.
doi:10.1016/j.addbeh.2006.08.005.
- Larimer, M.E., & Crouce, J.M. (2007). Identification, prevention, and treatment revisited: Individual-focused college drinking prevention strategies 1999–2006. *Addictive Behaviors*, 32, 2439–2468. doi:10.1016/j.addbeh.2007.05.006.
- Leigh, J., & Neighbors, C. (2009). Enhancement motives mediate the positive association between mind/body awareness and college student drinking. *Journal of Social and Clinical Psychology*, 28, 650–669. doi:10.1521/jscp.2009.28.5.650.
- McEvoy, P.M., Stritzke, W.G.K., French, D.J., Lang, A.R., & Ketterman, R. (2004). Comparison of three models of alcohol craving in young adults: a cross-validation. *Addiction*, 99, 482-497. doi: 10.1111/j.1360-0443.2004.00714.x.

- Mikulincer, M., & Florian, V. (1998). The relationship between adult attachment styles and emotional and cognitive reactions to stressful events. In J. A. Simpson & W. S. Rholes (Eds.), *Attachment theory and close relationships* (pp. 143-165). New York: Guilford Press.
- Molnar, D.S., Sadava, S.W., DeCourville, N.H., & Perrier, C.P.K. (2010). Attachment, motivations, and alcohol: Testing a dual-path model of high-risk drinking and adverse consequences in transitional clinical and student samples. *Canadian Journal of Behavioural Science, 42*, 1-13. doi: 10.1037/a0016759.
- Muthén, L., & Muthén, B. (1998-2012). Mplus Version 7.2. [Computer Software].
- NHS Choices (2011). What's your poison? A sober analysis of alcohol and health in the media. [ONLINE] Available at:
http://www.nhs.uk/news/2011/10October/Documents/whats_your_poison_1.0.pdf.
[Last accessed 26th April 2015].
- O'Connor, R.M., & Colder, C.R. (2005). Predicting alcohol patterns in first-year college students through motivational systems and reasons for drinking. *Psychology of Addictive Behaviors, 19*, 10-20. doi:10.1037/0893-164X.19.1.10.
- Reis, S., Curtis, J., & Reid, A. (2012). Attachment styles and alcohol problems in emerging adulthood: A pilot test of an integrative model. *Mental Health and Substance Use, 5*, 115-131. 10.1080/17523281.2011.619503.

- Schreiber, J.B., Nora, A., Stage, F.K., Barlow, E.A., & King, J. (2006). Reporting structural equation modeling and confirmatory factor analysis results: A review. *Journal of Educational Research, 99*, 323-327. doi:10.1037/a0014694.
- Scott-Sheldon, L.A.J., Terry, D.L., Carey, K.B., Garey, L., & Carey, M.P. (2012). Efficacy of expectancy challenge interventions to reduce college student drinking: A meta-analytic review. *Psychology of Addictive Behaviors, 26*, 393-405. doi:10.1037/a0027565.
- Standerwick, K., Davies, C., Tucker, L., & Sheron, N. (2007). Binge drinking, sexual behaviour and sexually transmitted infection in the UK. *International Journal of STD & AIDS, 18*, 810-813. doi:10.1258/095646207782717027.
- Steiger, J.H. (1990). Structural model evaluation and modification: An interval estimation approach. *Multivariate Behavioral Research, 25*, 173-180. doi:10.1207/s15327906mbr2502_4.
- Vinci, C., Peltier, M. R., Shah, S., Kinsaul, J., Waldo, K., McVay, M. A., & Copeland, A. L. (2014). Effects of a brief mindfulness intervention on negative affect and urge to drink among college student drinkers. *Behaviour Research and Therapy, 59*, 82–93. doi:10.1016/j.brat.2014.05.012.
- Wolfson, M., Champion, H., McCoy, T.P., Rhodes, S.D., Ip, E.H., Blocker, J.N.,...DuRant, R.H. (2012). Impact of a randomized campus/community trial to prevent high-risk

drinking among college students. *Alcoholism: Clinical and Experimental Research*, 36, 1767-1778. doi:10.1111/j.1530-0277.2012.01786.x.

Zamboanga, B. L., Horton, N. J., Leitkowski, L. K., & Wang, S. C. (2006). Do good things come to those who drink? A longitudinal investigation of drinking expectancies and hazardous alcohol use in female college athletes. *Journal of Adolescent Health*, 39, 229–236. doi:10.1016/j.jadohealth.2005.11.019.

Zeigler-Hill, V., Stubbs, W.J., & Madson, M. (2013). Fragile self-esteem and alcohol-related negative consequences among college student drinkers. *Journal of Social and Clinical Psychology*, 32, 546-567. doi: 10.1521/jscp.2013.32.5.546.

Appendix A

Data preparation, screening and Structural Equation Modelling (SEM)

Subscale and total scores were calculated and entered into SPSS as per the instructions given by each measure. Skewness and kurtosis were examined in SPSS using histograms of the data for each variable, which suggested that total AUDIT scores ($sk=.74$), Sociability Expectancy scores ($sk= -1.45$, $ku=3.43$), Preoccupied attachment ($ku=-.98$), Fearful attachment ($ku=-1.24$), Non-judgement ($ku=-.72$), Acting with Awareness ($ku=-.41$), Inclined/Indulgent Approach motivations ($sk= -.56$, $ku=-.41$), and Obsessed/Compelled Approach motivations ($sk=1.56$, $ku = 1.69$) were not normally distributed.

Heteroscedasticity describes a situation where the residuals (e.g. the amount of variability left in a dependent variable after accounting for the variability explained by predictor variables) are not uniformly distributed. This can be a problem in SEM, as it may undermine the assumption of multivariate normality. This was explored by conducting a number of multiple regression analyses where each of the endogenous variables was entered as the dependent variable, and all other variables were entered as predictor variables. Examining histograms of regression residuals for each analysis revealed normality, however, the scatterplots of predicted values versus residuals indicated a mild degree of heteroscedasticity among some of the variables.

SEM is a confirmatory approach, which involves testing a hypothesised model of how variables relate to each other. In an SEM analysis a covariance matrix is estimated based on

the hypothesised model. This is then compared to the observed data to see how well it fits. There are a number of ‘goodness of fit’ indices, which are reported to show how well the hypothesised model fits the data.

An SEM analysis can be performed using a number of estimation methods; most commonly used is the Maximum Likelihood Method (ML). However, this approach assumes that 1) the variables are normally distributed and 2) the distribution of the observed variables has multivariate normality (Byrne, 2010). As described above, these assumptions were not met with the study data, and therefore robust Maximum Likelihood (MLR), which is able to correct for non-normality in observed variables, was used.

Mplus version 7.2, the software used to conduct the analysis, provides a number of goodness of fit indices (GFI). The general consensus is to report the comparative fit index (CFI), the root mean square error of approximation (RMSEA) and the standardised root mean square residual (RMSR) (Hu & Bentler, 1999).

The RMSEA compares the fit of a ‘saturated model’ (where everything is assumed to be related) to the hypothesised model, while adjusting for complexity of the model. A score of ≤ 0.05 indicates good fit, and scores over 1.00 indicating a poor fit. The CFI compares the χ^2 of the tested model to the χ^2 null model, whilst accounting for sample size. Values $\geq .95$ indicate good fit. The SRMR is a GFI based on the difference between the residuals in the observed model and the hypothesised model. Values $\leq .08$ indicate a well-fitting model.