

UNIVERSITY OF SOUTHAMPTON

**Cognitive processing biases in alcohol use, abuse and dependence**

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### **Thesis abstract**

This thesis addresses the cognitive processing biases towards threat information that might underlie problem drinking. One reason problem drinkers commonly give for drinking is to cope with negative affect. Cognitive models suggest that alcohol impairs cognitive processes serving the function of escaping threatening cognitions, thus, modifying negative affect. In anxiety disorders, individuals show initial (automatic) preferential attention to threatening information, followed by strategic cognitive avoidance. Similar biases in processing might be seen in problem drinking, contributing to its development and maintenance. However, these biases have not been investigated fully. The paper comments on ways this could be rectified. If threat processing was found to be relevant to problem drinking, clinical implications would include the use of cognitive behavioural strategies to address threat appraisal and avoidance.

The empirical study tested the hypothesis that abstinent problem drinkers will demonstrate initial attentional biases towards, and strategic cognitive avoidance of, self-esteem threats and alcohol-related cues using two paradigms. Participants were a clinical group of abstinent alcohol dependent individuals and a non-clinical control group. The clinical group showed an attentional bias toward alcohol cues compared to the control group. A similar bias was not seen toward self-esteem threats. There was no evidence of cognitive avoidance to alcohol cues or self-esteem threats. In conclusion, the clinical group revealed a processing style compatible with their problem drinking pathology. However, threat processing appeared not to be a core part of the clinical group's psychopathology, although, further research needs to be done before more confident conclusions can be made.

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**The cognitive processing of threatening information in alcohol use disorders:  
Attentional bias and cognitive avoidance**

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Running head

PROCESSING INFORMATION IN PROBLEM DRINKING

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**The cognitive processing of threatening information in alcohol use disorders:  
Attentional bias and cognitive avoidance**

**Abstract**

This paper discusses the possible cognitive processing biases towards threatening information that may underlie problem drinking. One common reason problem drinkers give for drinking is to cope with negative affect, often in relation to perceived stressful and threatening life events. Several cognitive models suggest that alcohol impairs cognitive processes serving the function of escaping threatening cognitions and appraisals. In anxiety disorders, individuals are assumed to show initial (automatic) selective attention to threatening information followed by strategic cognitive avoidance. Comparable biases in processing may be seen in problem drinking, and might contribute to the development and maintenance of problem drinking patterns. By looking at how initial automatic attentional biases towards, and strategic cognitive avoidance of, threat information could be investigated, the paper discusses research so far into these biases within the alcohol field. Clinical implications include using cognitive behavioural strategies aimed at reducing avoidance of threat and promoting realistic threat appraisal.

Key Words: cognitive avoidance, attentional bias, alcohol, threat.

## **The cognitive processing of threatening information in alcohol use disorders:**

### **Attentional bias and cognitive avoidance**

Drinking to cope with negative affect in the face of perceived stressful life events is said to be a reason for problem or excessive drinking (Farber, Khavari & Douglass, 1980; Sayette, 1993). This paper focuses on how information-processing paradigms could expand our understanding of drinking to cope in response to psychologically and physically threatening information, which may be a factor in problematic drinking patterns. The paper will begin with a clinical overview of problem drinking, before describing the relationship between alcohol use, negative affect and threat. The paper will then look at cognitive processing paradigms that have been applied to understand the processing of threatening information in other disorders. Two core processes will be explored - attentional bias and cognitive avoidance. The paper will explore research into these cognitive processing biases in the alcohol field, which has so far centred on the processing of alcohol-related information, suggesting that these processes may also be seen in the processing of non-disorder-related threatening stimuli. Finally, key clinical implications and future research directions will be discussed.

### **Clinical overview of problem drinking**

Definition. Alcohol use disorders defined in the Diagnostic and statistical manual of mental disorders (fourth edition; American Psychiatric Association, 1994) include alcohol abuse and alcohol dependence. Alcohol dependence is seen when an

individual presents with cognitive, behavioural and physical symptoms indicating that the individual continues to drink despite severe adverse consequences. The alcohol use usually leads to tolerance, withdrawal and compulsive drinking. Alcohol abuse is a similar maladaptive repeated pattern of use leading to recurrent or major adverse consequences. However, the criteria of tolerance, withdrawal and compulsive use, are not met. In the present paper the alcohol use disorders will be described here as 'problem drinking' and individuals meeting disorder criteria will be referred to as 'problem drinkers'.

Epidemiology. Increased alcohol consumption is a risk factor for cancers, heart disease, liver cirrhosis, suicide, unintentional injuries and deaths, interpersonal conflict and criminal behaviour, as well as alcohol abuse and dependence (Damström Thakker, 1998). The prevalence of alcohol use disorders has been difficult to gauge across studies due to methodological differences. An epidemiological study in North America (Kessler, McGonagle, Zhao, Nelson, Hughes, Eshleman, Wittchen & Kendler, 1994) suggested lifetime prevalence of alcohol abuse and dependence to be over 9% and 14% respectively, based on the Diagnostic and statistical manual of mental disorders (third edition, revised; American Psychiatric Association, 1987) criteria. Alcohol use disorders have been found to be comorbid with other psychiatric disorders. In one study, Ross (1995) found that 55% of all individuals with a lifetime prevalence of alcohol abuse or dependence had another lifetime comorbid disorder, compared with 25% of individuals without alcohol use disorders. Alcohol use disorders were associated with increased likelihood of other drug abuse or dependence, antisocial personality disorder, anxiety, or mood disorder. It is suggested that comorbidity adversely affects the course of the disorder and treatment

outcome (Ross, 1995; Rounsaville, Dolinsky, Babor & Meyer, 1987). In sum, chronic or excessive use of alcohol increases vulnerability to physical and psychosocial difficulties.

Treatment outcome. There is evidence of efficacious treatments for problem drinking. These include brief motivational therapies, the teaching of cognitive and behavioural coping skills to enable individuals to live without alcohol, medication as an adjunct to other therapy and working with behavioural strategies on relationships (see review by Miller, Andrews, Wilbourne & Bennett, 1998). However, treatments often have high relapse rates (Polich, Armor & Braiker, 1981; Riley, Sobell, Leo, Sobell & Klajner, 1987). Even in Project MATCH (1993), which compared three respected treatments in a well-designed, successful study with trained therapists adhering to protocols, the primary goal of abstinence was not achieved in a substantial number of individuals (Edwards, 1999).

In order to improve conceptualisation and treatment, there have been calls for multi-factorial models of development and maintenance of alcohol abuse and dependence, incorporating social, physical and cognitive factors (Thombs, 1994; Wilson, 1987). One important expanding area of clinical cognitive psychology is that of understanding cognitive processes that may lead to the maintenance of psychopathology (e.g., Williams, Watts, MacLeod & Mathews, 1997). In the alcohol field, research into information processing is in its infancy (Bauer & Cox, 1998) therefore, multi-factorial models need to take account of such neglected areas. As will be discussed, drinking to cope with negative affect due to perceived stress or threat is seen to be a factor in excessive drinking, however, little is known about how

individuals with drinking problems process threat. The next section will discuss the relationship between alcohol use, negative affect and threat.

### **The relationship between alcohol use, negative affect and threat**

In this area of research (e.g., Thombs, 1994), the term ‘negative affect’ appears to be used interchangeably with stress, tension and negative emotions or states (anxiety, depression, frustration or low self-esteem). In this section, the relationship between alcohol use, negative affect and threat will be discussed. Cognitive correlates of alcohol use and related cognitive models will be explored.

### Reasons, expectancies, coping skills and alcohol consumption

Many different motives for drinking alcohol have been expressed, such as to escape problems, for social facilitation, to enhance enjoyment, due to perceived social pressure, and for celebratory activities. Generally, research has focused on two broad categories of motivation – firstly, drinking to escape, modify or cope with negative affect (drinking for negative reinforcement) and secondly, drinking to be sociable and convivial (drinking for positive reinforcement) (Farber et al., 1980). In a non-clinical community sample, Abbey, Smith, & Scott (1993) found that individuals who drank to cope with perceived stress and stressful events drank more heavily and frequently per month than those who drank for social reasons. This was especially true for young adults. In a general community sample, Cooper, Russell & George (1988) found that ‘drinking to cope’ was the most powerful predictor of problem drinking and that social reasons did not predict drinking status. Studies have also found the same relationship in clinical populations of problem drinkers. Carpenter & Hasin (1998a) found that ‘drinking to cope’ was a more prominent motive for

alcohol dependent individuals than for a healthy comparison group. Individuals with alcohol abuse did not differ from the comparison group. Further, although drinking to be sociable was strong for all participants, those with alcohol dependence were more likely to report 'drinking to cope' motives. In all, these studies suggest that the motive of 'drinking to cope' is associated with increased alcohol problems compared to other expressed reasons (e.g., to be sociable).

Different models may explain the relationship of 'drinking to cope' with problematic drinking patterns, one popular model is that 'drinking to cope' is a risk factor for the development of later problems. However other models may exist, for example, as an individual increases their consumption, they may generalise the situations in which they drink to include drinking to cope with negative affect. Alternatively, higher levels of 'drinking to cope' in problem drinkers might be seen because of their negative affect at the time of assessment or the greater severity of their alcohol problems rather than due to differences prior to the development of drinking problems. However, Carpenter & Hasin (1999) tested these three models and their predictions in a cross-sectional design. Most support was found for the risk factor model. Further evidence of this causal relationship comes from a prospective study (Carpenter & Hasin, 1998b). It was demonstrated that 'drinking to cope' motives predicted a diagnosis of alcohol dependence a year later. This was not seen for alcohol abuse. Furthermore, there was no association between drinking for enjoyment enhancement and diagnosis one year on. However, the study is limited due to the small number of participants who developed alcohol use disorders.

Researchers have also studied two other factors in relation to reasons for drinking - expectations of outcome for drinking, and general coping style. Outcome

expectancies refer to preconceived ideas of particular outcomes and contingencies after drinking, such as tension relief (a positive expectancy) or getting into debt (a negative expectancy). Expectations differ from reasons, in that expectancy does not necessarily lead to drinking to achieve this effect (Williams & Clark, 1998). According to Lazarus & Folkman (1984) coping can be divided into two styles. Avoidant or emotion-focused coping involves reducing emotional distress through avoidance, denial, and tension reduction. In contrast, problem-focused coping means responses directed at altering the source of the stress (changing the environment or one's behaviour). Cooper et al. (1988) found that individuals with strong positive expectancies who had avoidant coping styles were most likely to 'drink to cope'. These individuals drank more and were more likely to experience drinking-related problems. The relationship of drinking in response to stressful events may also be moderated by other factors. Cooper, Russell, Skinner, Frone & Mudar (1992) found that a stressful life event was predictive of men's alcohol use and drinking problems, particularly among those who had a general avoidant coping style or who held strong positive expectancies of alcohol's effects. Therefore, individual characteristics may influence whether an individual drinks alcohol to cope with stressors.

In sum, broad categories of motivation for drinking include being sociable and coping with problems and negative affect. In both non-problem and problem drinkers, 'drinking to cope' is associated with heavier drinking patterns. Further, drinking to cope may be a risk factor for the development of drinking problems and individual characteristics (such as cognitive coping styles, expectancies and gender) may influence the stress-related effects of alcohol use. This paper will now turn to

cognitive models which investigate the relationship between alcohol, cognitive processing, stressful and threatening situations and tension reduction.

#### Cognitive processing models

The following models are diverse in their details, but one common theme is that alcohol is seen to change affective reactions indirectly by impacting on cognitive processes. Studies have shown alcohol may increase, decrease or not affect tension in problem and non-problem drinkers (Thombs, 1994). Cognitive theorists have emphasised the role of cognitive mediating processes in attempting to understand this complex empirical evidence (Wilson, 1987).

Self-awareness model. Hull's (1981) model suggests that alcohol inhibits cognitive processing of information that is self-relevant, decreasing negative self-evaluation and, thus, tension. Crucially, alcohol is supposed to decrease self-awareness (self-relevant, internally generated information) following failure and in situations eliciting negative self-concepts. Hull, Levenson, Young & Sher (1983) found that social drinkers who consumed alcohol before being asked to give a brief speech about themselves used fewer self-focused statements within the speech compared to those who had only consumed a placebo non-alcoholic drink.

This model is problematic, as alcohol does not reliably reduce self-awareness in terms of reducing the frequency of self-evaluative statements as Hull (1981) predicts. Yankofsky, Wilson, Adler, Hay & Vrana (1986) found that individuals who consumed alcohol before getting negative interpersonal feedback modified the meaning of their feedback, rather than reducing the total number of self-evaluations as compared with a no alcohol group. Further, alcohol has been seen to increase self-



evaluation and worry (e.g., Keane & Lisman, 1980). Again, this model does not predict such an outcome.

Attention-allocation model. Steele & Josephs (1988; 1990) suggest that alcohol narrows cognitive processing down to perceiving only immediate cues and the most salient parts of the experience. If there is a distracting (benign) activity, alcohol consumption will lead to a reduction of anxiety as the drinkers' reduced attentional capacity is diverted from internal processing of stressful cognitions to the task in hand (e.g., for example, reducing internal comparisons between actual self and the ideal). However, in the absence of a distracting activity, anxiety may be increased as attention remains focused on the salient worries and thoughts. Steele & Josephs (1988) examined the degree to which alcohol and a distracting activity (rating art slides) affected self-reported anxiety in individuals anticipating giving a self-disclosing speech. Anxiety was reduced to a greater extent when participants were given alcohol and a distracting activity, than if they only had an activity, or nothing (no activity or alcohol). Anxiety worsened when participants had drunk alcohol but were not given an activity. A criticism of this model is that studies have shown that tension reduction can still occur after alcohol has been consumed even without a distracting activity (e.g., Steele, Southwick & Pagano, 1986), whereas the model would predict that this would not happen. However, the model does provide an understanding of inconsistencies in the anxiolytic effects of alcohol. Further, it is suggested that alcohol is often consumed in distracting environments, thus producing stress-reducing effects (Sayette, 1993).

Appraisal-distraction model. Sayette (1993) suggests that alcohol disrupts the appraisal or evaluation of stressful information if it is consumed before the stressor's

arrival. Alcohol's pharmacological effect might constrain the spread of activation of threat and reduce recall of previously stored associated information from long-term memory (Bower, 1981). Sayette, Smith, Breiner & Wilson (1992) found that participants who had drunk alcohol were less likely than those who had not to exhibit negative mood when informed of a prospective self-disclosing speech. Self-report studies show that when a stressor is introduced after alcohol consumption, there are anxiolytic effects (e.g., Yankofsky et al., 1986). However, increased negative affect can occur when drinking follows a stressful appraisal (e.g., Keane & Lisman, 1980). This model provides an explanation that can accommodate these apparently contradictory findings. However, unlike the other two models, there has been limited theory-generated research to support its predictions.

#### Critical analysis and synthesis of cognitive processing models

The models outlined above suggest that alcohol consumption reduces tension and stress by impacting on cognitive processes, albeit via different mechanisms. They imply that the motivation to drink alcohol in order to reduce threatening and negative self-appraisals may be a factor in problem drinking (e.g., Hull, 1981). Although, tension or stress may not be reduced in every situation, people may 'wrongly' drink due to strong partial negative reinforcement effects (Sayette, 1993), thus, partial reinforcement may maintain and motivate excessive and problematic drinking despite adverse consequences (Steele & Josephs, 1988).

There are several general methodological limitations of studies supporting the models, these include the use of unrepresentative samples. Studies use mainly male, undergraduate, social drinkers with short drinking histories as participants, rather than including a broader spectrum of drinkers. A further limitation is that studies are



generally laboratory-based and do not reflect real-life scenarios or contexts, thus limiting their generalizability.

Type of threat. Within these models, threats to an individual's self-concept and self-esteem are seen to be important factors in alcohol use and misuse. For example, Hull (1981) and Steele & Josephs (1988: 1990) have focused on self-esteem threatening situations involving interpersonal evaluation or academic task failure, although Sayette (1993) applies his model to both psychosocial and physical stressors. Further, Higgins & Marlatt (1973; 1975) found that the anticipation of interpersonal evaluation was a trigger for increased alcohol consumption, whereas the threat of an electric shock was not. However, drinking in relation to physical threats should not be dismissed, as studies have found tension reduction related to alcohol consumption in the face of such threats (e.g., Noel, Lisman, Schare, Maisto, 1992). Furthermore, Pihl, Finn & Peterson (1989) reported that non-problem-drinking sons of problem drinkers showed greater autonomic reactivity in response to an electric shock than other individuals. Such a hypersensitivity to threat was seen as a risk factor to the development of problem drinking. More research is needed in this area as generally it appears that the investigation into the processing of physical threat is limited compared to psychosocial stressors.

What is missing from cognitive conceptualisations? These models suggest that alcohol consumption reduces the appraisal of threat and impact of self-evaluation, moreover, reinforcement of this effect may lead to problematic drinking problems. This is compatible with literature suggesting that drinking to cope with negative affect is associated with heavy drinking patterns. Problem drinkers appear to fear certain stressors and threats, and try to attenuate and avoid them. What is not

explored in these cognitive conceptualisations is how problem drinkers process and respond to threatening stimuli - is their processing of threat different from non-problem drinkers? Such processing of threat may be related to the motivation of 'drinking to cope', or may be linked to the effect of alcohol in blocking negative threat appraisals. Therefore, an area that could be expanded within cognitive conceptualisations is how problem drinkers cognitively process and appraise threatening stimuli. It may be that such processing of threat (e.g., threats to self-esteem) is a characteristic and discriminating feature in their psychopathology.

### Summary

Research into reasons for drinking and alcohol use has found that drinking to cope, or to modify negative affect is associated with problem drinking patterns. Cognitive models offer support, in that alcohol consumption is seen to affect cognitive processing, leading to tension reduction. It is suggested that alcohol can allow an individual to escape from negative cognitions and psychological stress. Drinking in response to self-esteem threats is seen as important. So far research has not explored how problem drinkers cognitively process threat and respond to it. The next section will explore how information-processing paradigms can be introduced to understand threat processing in alcohol use disorders.

### **Processing of emotional information**

To investigate threat processing it is necessary to look at the terminology and empirical paradigms of information processing research and how such paradigms have been used. The paper will then turn to research that has been carried out in problem drinking and the possibilities of investigating threat processing.

Information processing paradigms can aid the understanding of what cognitive information is attended to and how it is encoded, structured or recalled. Paradigms can investigate both conscious phenomena and processing that occurs outside conscious awareness (Williams et al., 1997).

Two common, core, information-processing phenomena are attentional biases and cognitive avoidance. An attentional bias is said to occur when there is a discrete change in an individual's focus of attention. The individual becomes aware of one aspect of their environment, as opposed to other more prominent aspects, for example, attending to threatening or novel stimuli or such stimuli that is related to a current concern (Williams et al., 1997). Cognitive avoidance occurs when a person distracts himself or herself away from attending to, for example, personally relevant information (Foa & Kozak, 1986).

These two phenomena have been associated in formulations of threat processing (Beck & Clark, 1987; Mogg & Bradley, 1998). Mogg and colleagues (Mogg & Bradley, 1998; Mogg, Bradley, de Bono & Painter, 1997; Mogg, Mathews & Weinman, 1987) suggest a two-stage model of threat processing - a vigilance-avoidance processing pattern. Anxious individuals are thought to demonstrate attentional biases (vigilance) to personally threatening information, which may exacerbate an anxious state. Attentional biases are hypothesised to occur at initial stages of processing, driven by automatic (involuntary and inflexible) processes and occurring before information has entered conscious awareness (e.g., Mogg, Bradley, Williams & Mathews, 1993). The phenomena of cognitive avoidance is proposed to follow attentional biases, as the individual tries to avoid strategic (detailed, deliberate and conscious) processing of the threatening stimuli (e.g., Mogg et al., 1987). The

vigilance-avoidance pattern may explain maintenance of anxiety, as, after the detection of threat, attempts to avoid further processing allows relief from and reduction of discomfort. Cognitive avoidance is seen to be a strategy compatible with behavioural avoidance (Mogg et al., 1987). However, such avoidance means the individual may be prevented from either habituating to the threatening stimuli or realistically appraising them with disconfirmatory information. Therefore symptoms are maintained, since initial threat stimuli never lose their valence (Foa & Kozak, 1986; Mogg et al., 1997).

Beck & Clark (1997) present another model of threat processing in anxiety. In a three-stage model they suggest that threat is processed automatically at first and then strategically. Initial automatic vigilance and orientation to threat serves as an early warning threat detection system, this leads to the second stage, where the activation of the 'primal mode' occurs. These are schemas (memory structures) encompassing primitive cognitive, behavioural and physical responses to maximise safety and reduce danger. This stage involves both automatic and strategic processing. In the last stage, strategic processing takes over with more reflective consideration of the situation and coping abilities. At this stage, anxiety may escalate due to the blocking of objective appraisal, decline due to constructive appraisal of the situation or decline due to defensive behaviour of escape and avoidance (prompted by the responses of the primal mode). Again, failure to process threat strategically may maintain symptoms. Beck & Clark's (1997) model explicitly allows for the possibility that cognitive and behavioural avoidance do not necessarily have to coincide - cognitive avoidance may occur even if the threat is inescapable. However, if behavioural avoidance occurs, presumably this would mean that cognitive

avoidance occurs too. A limitation of the model is that it does not appear to have been directly tested in empirical studies, unlike Mogg and colleagues' model.

Both models suggest that attentional biases occur in the early automatic stages of threat processing. Subsequently, cognitive avoidance may function to abort more strategic, controlled processing of the threat stimuli. The models do not suggest that automatic and strategic stages of processing are totally independent of one another over time. Beck & Clark (1997) suggest that the processing stages can coexist, although only automatic processing occurs initially and strategic processing begins to predominate at a later stage in the processing. Mogg & Bradley (1998) suggest that the vigilance-avoidance pattern may happen repeatedly across time. The models do not explicitly state whether cognitive avoidance is driven by strategic or automatic processes, however, Lavy & van den Hout (1994) suggest that avoidance is a strategic process, based on clinical evidence from anxious patients.

There are various perspectives on possible mechanisms underlying cognitive biases towards threat in anxiety. Beck & Clark (1997) suggest that their model is schema-driven, where overactive concern-relevant schema is sensitive to and selectively processes schema-congruent information (thus initiating the first stage of their model). Mogg & Bradley (1998) suggest that attentional biases towards threat information are determined by multi-component cognitive-motivational systems. Certain variables, such as, the nature of the stimulus, the situation, arousal level, prior learning experiences and trait anxiety, influence how a stimulus is appraised. Appraisal, in turn, determines behavioural, physical and cognitive responses (including the allocation of attentional resources). Individuals with anxiety are suggested to have lower thresholds for appraising threatening stimuli.

In sum, anxiety models have suggested threat processing involves a consecutive pattern of initial automatic attention to threat followed by strategic avoidance. Attentional bias is suggested to occur at the initial, automatic stages of processing, while cognitive avoidance occurs subsequently in an effort to block strategic processing of threat. This pattern is suggested to be functional, allowing early detection of threat and reduction of discomfort. However, the lack of realistic appraisal of (and failure of habituation to) threat stimuli as a result of strategic avoidance leads to the maintenance of anxiety.

#### Attentional bias: Methodological paradigms and empirical findings

Attentional biases have been tested in a variety of experimental designs. These include filtering and encoding paradigms (e.g., dichotic-listening and visual-spatial tasks) and the emotional Stroop test (Wells & Matthews, 1994). Due to limited space, the emotional Stroop task will be concentrated on here, as it is the most popular task with which to demonstrate attentional biases (Wells & Matthews, 1994; Williams et al., 1997). In the task (based on Stroop, 1935), participants are shown words printed in different colours and are required to name the colour of the ink aloud whilst ignoring the word's meaning. The categories of words include personally relevant or non-relevant (neutral) words. Colour-naming latency is compared between relevant or non-relevant words or between persons with or without clinical disorders (Foa, Feske, Murdock, Kozak & McCarthy, 1991). Studies using the modified Stroop task in anxiety disorders have demonstrated increased response times to disorder-specific, fear-related words (Foa et al., 1991; Kaspi, McNally & Amir, 1995; Mathews & Klug, 1993; Mathews & MacLeod, 1985; Watts, McKenna, Sharrock & Trezise, 1986). An attentional bias is suggested to



occur as individuals preferentially allocate attention toward the personally relevant content of the words to the detriment of the colour-naming task. Evidence for automatic processing before awareness comes from brief, masked (subliminal) presentations of salient stimuli on the Stroop task, here, anxious individuals still demonstrate biases for negative stimuli e.g., Mogg et al. (1993). However, the automaticity of this process has been contested (Thorpe & Salkovskis, 1997).

In other disorders, Stroop studies have generally looked at attentional bias towards disorder-related words. Studies have found longer colour-naming latencies for disorder-related stimuli for example, in those who have attempted suicide (Becker, Strohbach & Rinck, 1999), individuals with persecutory delusions (Bentall & Kaney, 1989; Kinderman, 1994), eating disordered patients (Perpiñá, Hemsley, Treasure & de Silva, 1993); and gamblers (McCusker & Gettings, 1997). There are few studies that have looked at attentional biases to non-disorder related information. However, studies of bulimia nervosa have investigated attentional biases to threatening information using the Stroop task. McManus, Waller & Chadwick (1996) looked at biases to different types of threat information (such as self-esteem and physical threat). Women with bulimia showed greater attentional biases to threat stimuli than comparison women, particularly to self-directed, self-esteem threats. In a non-clinical population of dieters, Quinton (1998) found that attentional bias to self-esteem threat was positively associated with the level of bulimic attitudes.

Although the Stroop task appears to demonstrate an attentional bias towards disorder-relevant information, there are alternative explanations for the interference. Firstly, an elaboration hypothesis (Foa et al., 1991), where it is thought latency in colour-naming relevant words is due to the activation of complex concern-relevant

schema. This leads to task-irrelevant processing, and more processing capacity being needed competing with resources needed to complete the colour-naming task. This is similar to semantic network theory (e.g., Collins & Loftus, 1975). Secondly, de Ruiter & Brosschot (1994) suggested the interference on the emotional Stroop task was due to the effort of trying to shut out negative information. Williams et al. (1997) suggest this theory is flawed, as the explanation has to account for interference on a very wide range of stimuli, including positive concern-relevant information. Thirdly, when an individual sees a threat word they may become temporarily more anxious and this arousal conflicts with task completion (Mogg & Bradley, 1998). Further, colour-naming latency may be due to a response selection bias rather than an attentional bias (Lubman, Peters, Mogg, Bradley & Deakin, 2000), therefore, the Stroop task is not an undisputed measure of attentional processes. However, McManus et al. (1996) suggest that research should concentrate on how the many suggested mechanisms may interact with each other as opposed to treating them as discrete alternatives.

Artifactual explanations of the Stroop have also been considered. The Stroop has been presented in different formats, including a card presentation (where all the words of the same type are presented together on one card) and a computer presentation (where words are presented individually, and the presentation of individual words are intermixed across categories). The different formats may evoke different underlying mechanisms (Kindt, Bierman & Brosschot, 1996). It has been proposed that greater priming effects of consecutive words may occur on the card format, which could account for the more robust findings (Dalglish, 1995). However, Williams, Mathews, & MacLeod (1996) have suggested that both formats

are affected by priming, but that these effects are inadequate to account for differential latencies to colour-name categories of words. In anxiety disorders, it has also been suggested that the delayed latency to colour-name certain material is related to emotional words in general (Martin, Williams & Clark, 1991). However, Mathews & Klug (1993) found that the interference was specifically related to concern-relevant words (be they positive or negative in valence), although, there may be a slight bias towards generally negative emotional stimuli (Williams et al., 1996).

Summary. The emotional Stroop has been the most popular paradigm to demonstrate attentional biases. Robust Stroop effects have been seen towards threatening and disorder-related stimuli across clinical disorders. However, the mechanisms underlying the performance on the Stroop task are not clear-cut as there are alternative explanations to attentional bias.

#### Cognitive avoidance: Methodological paradigms and empirical findings

Compared to attentional bias studies, there have been far fewer published investigations into the cognitive avoidance of information, consequently, these paradigms and mechanisms have not been so rigorously and systematically examined as, for example, the Stroop task. The phenomenon of cognitive avoidance has been cited to explain the failure to find a memory bias for threat-related information in clinically anxious individuals (e.g., Mogg et al., 1987), despite consistent finding of increased attention to threat information. However, Mogg et al. (1997) failed to find a pattern of vigilance-avoidance processing in a non-clinical group of high trait anxious individuals using a visual dot-probe (visual-spatial) paradigm. Amir, Foa, & Coles (1998) demonstrated vigilance-avoidance processing of socially threatening material in individuals with clinical social phobia. Here participants had to decide

whether a sentence was semantically associated with a following cue word. On critical trials, the sentence ended with a word with two meanings, one of which was both unrelated to the cue word and was also socially threatening. The cue word was presented after either a short or long interval. On these critical sentences, it was found that social phobics took longer to decide on the association at the short interval compared to a control group but were relatively faster at the longer interval. Therefore, it was suggested that socially phobic individuals initially activated the inappropriate meaning of homographs, but that they later inhibited the threatening meanings.

Outside of anxiety disorders, research into the phenomenon of cognitive avoidance is even sparser. In bulimia, studies have investigated whether a pattern of initial attentional bias followed by strategic cognitive avoidance occurs in response to non-disorder threatening words. It was suggested that this processing would be likely, because binge eating has been conceptualised as a function of a response to threat stimuli (Heatherton & Baumeister, 1991). As described above, attentional biases have been found (McManus et al., 1996). In contrast, Waller, Quinton & Watson (1995) found that women with more bulimic attitudes showed slower responding (cognitive avoidance) to threat than neutral cues than those with less strong bulimic attitudes.

Waller and colleagues (Meyer, Serpell, Waller, Murphy, Treasure & Leung, under consideration; Waller & Meyer, 1997) have developed a paradigm based on Beck & Clark's (1997) model. The premise was that cognitive avoidance occurs as threat processing enters a deliberate appraisal stage, therefore, it was suggested that cognitive avoidance could be demonstrated with a task requiring explicit strategic

processing of threat material – in this case an anagram solution task using threat and other word categories. Cognitive avoidance would be demonstrated by longer times to solve anagrams. In a female, non-clinical sample, Waller & Meyer (1997) found that there was a positive association between eating disorder traits and longer solution times for food words and threat words (specifically self-directed, self-esteem threats). Using the same paradigm Meyer et al. (under consideration) looked at cognitive avoidance in clinical eating-disordered groups. It was found that those with bulimia nervosa took significantly longer to solve self-esteem threat anagrams than non-clinical comparison women, other eating-disordered groups (individuals with restrictive or bulimic anorexia) did not differ from the non-clinical group and none of the groups differed in time taken to solve food or neutral words.

Overall, compared to attentional bias, research in cognitive avoidance is extremely sparse and in need of systematic study, however, studies have shown evidence for a defensive avoidance of processing threatening stimuli. It may be that certain tasks are more efficient than others in highlighting avoidance. Waller & Meyer (1997) and Meyer et al. (under consideration) suggest that cognitive avoidance is more likely to be found in tasks that require explicit threat appraisal (e.g., the anagram paradigm) than in tasks where such appraisal is not key to the task.

### Summary

Information processing research investigating threat processing has predominantly centred on anxiety disorders. Here, models suggest that there is a pattern of initial automatic capture of attention by threat material (attentional bias) followed by avoidance of strategic processing (cognitive avoidance). This pattern may maintain the anxiety symptoms. The emotional Stroop task is often employed

to investigate attentional processes although it is seen that there are other explanations for performance on the task. Across clinical disorders, studies have found that individuals demonstrate robust Stroop effects for threat-related as well as for disorder-related information. In contrast, there has been less research into the later process of cognitive avoidance of strategic processing, however, studies have found cognitive avoidance to threat information in anxiety and bulimia. The next section will look at research into attentional biases and cognitive avoidance so far in alcohol use disorders.

#### **Attentional bias and cognitive avoidance research in alcohol use disorders**

In the alcohol field, attentional bias phenomena have so far been concerned with disorder-related (alcohol-related) words in a handful of studies predominantly using the Stroop paradigm. Johnsen, Laberg, Cox, Vaksdal & Hugdahl (1994) and Stetter, Ackermann, Bizer, Straube & Mann (1995) found that alcohol dependent individuals were significantly slower than the control group to colour name disorder-related words (as compared with neutral words). Stetter, Challupa, Ackermann, Straube & Mann (1994) found a trend towards impaired colour-naming for disorder-related words in dependent drinkers but this was not statistically significant when compared to controls. Moreover, Stetter, Ackermann, Scherer, Schmid, Straube & Mann (1994) found a similar selective processing of alcohol-related words in a dichotic listening task.

In explanation of these findings, Johnsen et al. (1994) hypothesise an attentional bias to alcohol stimuli where the stimuli have become salient due to a history of alcohol-related experiences. The implication of such a bias in attentional

processing is a rigid attention to alcohol-related stimuli. This distraction by stimuli may increase preoccupations ultimately reducing resistance to consume alcohol, thereby, attentional biases may be implicated in the maintenance of and relapse back into problem drinking. However, explanations for the interference on the Stroop task regarding alcohol-related information do not categorically support an attentional bias interpretation. In contrast, Stetter et al. (1995) opt for the elaboration hypothesis. However, both these explanations highlight a processing style compatible with psychopathology with alcohol use disorders.

Cognitive avoidance of alcohol information has been studied in abstinent alcohol dependent individuals. Stormark, Field, Hugdahl & Horowitz (1997) suggested that an initial vigilance of alcohol information followed by cognitive avoidance would occur similar to that seen in anxiety. This assumption was based on Tiffany's (1990) model of substance use, he suggested that abstinent substance-dependent individuals would attempt to inhibit substance use behaviours that may be automatically elicited by related stimuli. It was suggested that nonautomatic cognitive and behavioural processes might be engaged to prevent substance use such as avoiding stimuli. Therefore, Stormark et al. (1997) suggested that abstinent problem drinkers would initially demonstrate a selective processing bias to salient alcohol stimuli (its salience being due to a history of repeated practice). However, once the stimuli had been recognised, cognitive avoidance of further processing would take place to avoid the threat of eliciting urges to drink alcohol. They found evidence to support this pattern in a visual dot-probe task, however, this study appears not to have been replicated, therefore, the findings must be treated as preliminary.

### Expanding research in alcohol dependence

At present, attentional bias and cognitive avoidance research in the alcohol field has concentrated on disorder-related stimuli. To the author's knowledge, there have not been any investigations into alcohol dependence and the cognitive processing of general threat-related information. It can be hypothesised that these phenomena will be seen in relation to threat processing, since problem drinkers use alcohol to cope with and attenuate psychological stress and negative affect (e.g., Cooper et al., 1988). Furthermore, cognitive models (e.g., Hull, 1981; Sayette, 1993; Steele & Josephs, 1990) suggest alcohol impairs the cognitive appraisal of threat, reducing negative evaluations. It can therefore, be suggested that attentional bias followed by cognitive avoidance of threat-related information is an underlying feature of alcohol use disorders, where the drinking behaviours appear to serve the function of blocking appraisal of threat (restricting negative cognitions and subsequent negative emotions). Therefore, problem drinkers may also show a characteristic vigilance-avoidance pattern of processing threat similar to threat processing in anxiety. This pattern of threat processing may be a maintenance factor in problem drinking, as the constant avoidance of threat would lead to perpetual brief exposure to stimuli and the prevention of full or complete emotional processing (Foa & Kozak, 1986; Rachman, 1980). This would sustain the need to drink to escape and alleviate threat cognitions and negative emotions. Further, this form of processing may act as a risk factor for drink problems, increasing vulnerability to drinking due to the reinforcing effects of alcohol on cognitive appraisal and negative affect.



### **Future research directions**

There is a need to investigate cognitive processing in problem drinking in more detail. As this paper has highlighted, there is a gap in our knowledge of how threat is processed. It has been hypothesised that attentional bias to and cognitive avoidance of general threat may be seen. Attentional biases may only be seen when using certain paradigms, therefore, a broad range of paradigms should be used in such research (Stewart, Conrod, Gignac, & Pihl, 1998). Similarly, investigating cognitive avoidance would benefit from the use of a range of research methods. Meyer et al. (under consideration) suggest that cognitive avoidance will be seen more readily in tasks that involve explicit strategic processing of threat (such as the anagram task).

An area of interest is whether individuals process all types of threat similarly, or if some domains are more 'sensitive' than others. This review has found evidence that self-esteem threats are important, however, it may be that other threats would lead to the same hypothesised vigilance-avoidance response. In bulimia, McManus et al. (1996) looked at different domains of threat and such a paradigm could be transferred into the alcohol field. It may be that subgroups of individuals are more likely to show vigilance-avoidance processing of threat than others, for example, alcohol dependent individuals may be more likely to demonstrate this processing than non-dependent alcohol abusers or non-problem drinkers. Furthermore, there is the possibility that other subgroups (not based on diagnosis) will be more likely to show this processing, such as those who 'drink to cope' rather than those who drink for other reasons or those who generally use a more avoidant coping style (e.g., Cooper et al., 1988).

Prospective studies could look at whether attentional bias followed by cognitive avoidance of threat are risk factors in the later development of problem drinking. Longitudinal studies could also determine if this sort of processing was a risk factor in relapses following a period of abstinence, and if there is a relationship with the occurrence of negative, stressful life-events.

It is also necessary to continue to research attentional bias and cognitive avoidance of alcohol-related information, as such cognitive processes may relate to the development and maintenance of the disorder. First, studies could replicate Johnsen et al. (1994) and Stetter et al. (1995) and extend their findings by using other paradigms to gain more knowledge of underlying mechanisms. Comparing attentional biases to alcohol-related words in different categories of drinkers may give some insight into the development and stability of the underlying style of processing. Therefore, different subgroups could be compared (such as non-drinkers, social drinkers, current alcohol abuse/dependent drinkers and abstinent drinkers). It may be hypothesised that severity of alcohol dependence is associated with extent of processing style. Using the Stroop task, Stetter et al. (1995) investigated this hypothesis but did not find an association between alcohol dependence and attentional bias, however, there was a positive association between extent of bias and other alcohol dependence indices, history of withdrawal seizures and alcohol consumption. This pattern could be re-examined in future studies.

In terms of investigating cognitive avoidance of alcohol cues, it would be interesting to replicate Stormark et al.'s (1997) study who suggested that cognitive avoidance occurred in abstinent individuals in an attempt to avoid alcohol cues that may increase urges to drink. Again, studies could look at cognitive avoidance using

different paradigms, for example, an anagram study or a homograph decision paradigm similar to Amir et al. (1998) with alcohol-related homographs such as 'shot', 'bar' and 'spirits'.

Finally, prospective studies could investigate if attentional bias is a risk factor in the development and increase of problem drinking patterns. Attentional bias to alcohol cues without subsequent cognitive avoidance may be a vulnerability factor to relapse.

### **Clinical implications**

There are many different clinical implications of this review. If a pattern of processing is found that suggests individuals show more initial attention to and subsequent escape from negative information (e.g., self-esteem threats) then treatments that do not address this area may be undermined as soon as the individual faces threatening situations in abstinence. Treatments would need to focus on tackling the need to escape from threatening cognitions. Wells & Matthews (1994) recommend that promoting meta-cognitive detachment would be an important strategy, where an individual can step back from negative self-evaluations whilst remaining aware of them. They suggest such detachment may enable more adaptive strategies to be chosen in response to stressful cognitions. Such strategies may allow the individual to reduce threat avoidance and increase the likelihood of realistic appraisal. Other cognitive-behavioural strategies could be employed to help individuals desensitise to threat, including exposure, and response prevention and the modification of negative appraisals and underlying beliefs (e.g., Persons, 1989; Young 1994).

Furthermore, helping a problem drinker to recognise links between threat and the likelihood of drinking would be essential, therefore, strategies that look at high-risk situations and that identify other coping responses outside of drinking alcohol would seem to be particularly important. These approaches are already seen in Marlatt & Gordon (1985). Strategies that teach tolerance of and alternative coping strategies for negative affect as a result of negative cognitions may be particularly appropriate. These include the emotional regulation and distress tolerance skills seen in Dialectical Behavioural Therapy (Linehan, 1993).

In terms of cognitive bias to alcohol-related stimuli, it may be useful to look at exposure strategies to reduce attentional bias to alcohol cues. Alternatively, it may be useful to reinforce cognitive avoidance of alcohol cues in abstinent problem drinkers (Tiffany, 1990). Miller et al. (1998) suggest that behavioural strategies are more effective than cognitive strategies alone and therefore, behavioural avoidance strategies or behavioural coping strategies may be an important consideration.

Finally, cognitive processing measures may be sensitive enough to act as measures of alcohol dependence, or measures of change over treatment. However, much more research needs to be done on measures such as the Stroop to verify its validity and test-retest reliability (Kindt et al., 1996).

### **Conclusion**

Cognitive bias research in problem drinking is limited and concentrates on biases to disorder-related information. There is limited research into cognitive processing of other types of information in problem drinking. The paper has brought together two areas of literature – the use of drinking to cope with negative affect (and

associated cognitive models of the effects of alcohol consumption) and information processing models of threat processing in other disorders. Threat appraisal in anxiety has been understood in terms of initial automatic attentional bias to and subsequent strategic cognitive avoidance of threat stimuli. This pattern may be a characteristic of alcohol dependence since the function of drinking may serve to escape from the impact of threat appraisal. This paper has delineated possible research directions both to investigate general threat processing in alcohol use and to further explore biases for disorder-related information. The clinical implications of threat processing in alcohol use disorders include addressing the cognitive avoidance of threat via cognitive behavioural strategies.

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**Cognitive processing biases for alcohol-related  
and threat-related information in alcohol dependence**

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**Cognitive processing biases for alcohol-related  
and threat-related information in alcohol dependence**

**Bethany R. O'Connell**

**Abstract**

**Aim.** The study tested the hypothesis that recently abstinent problem drinkers will demonstrate attentional biases and cognitive avoidance to self-esteem threatening and alcohol-related cues. **Design.** Between-group comparisons were used for the categorical analysis of the hypothesis, while a within-group correlational design was used to test the hypothesis dimensionally. **Setting.** An alcohol abstinence programme in the South of England. **Participants.** The clinical group ( $N = 30$ ) all met criteria for current diagnosis of alcohol dependence. Members of the control group ( $N = 30$ ) did not meet this diagnosis. **Measurements.** A modified Stroop paradigm investigated attentional bias, an anagram solution paradigm investigated cognitive avoidance and the Severity of Alcohol Dependence Questionnaire-Community was used for correlational hypotheses. Participants also completed a verbal intelligence measure and questionnaires on alcohol use criteria. **Findings.** In the Stroop task the clinical group showed attentional bias toward alcohol cues compared to the control group, but not toward self-esteem threats. This bias was unrelated to severity of alcohol use. In the anagram task there was no evidence of cognitive avoidance. **Conclusions.** The problem drinkers reveal a processing style compatible with their psychopathology. Relapse prevention therapies may need to involve strategies to counter this processing bias toward alcohol cues which may lead to increased likelihood of alcohol consumption.

**Cognitive processing biases for alcohol-related  
and threat-related information in alcohol dependence**

**Introduction**

Problem drinking as seen in alcohol abuse and dependence (Diagnostic and statistical manual of mental disorders, fourth edition, DSM-IV; American Psychiatric Association, 1994), is influenced by multiple factors (Thombs, 1994). One major area of research is that of drinking to regulate negative mood in the face of perceived stressful events (Cooper, Russell & George, 1988). Drinking to cope with negative affect (anxiety, low-self-esteem, frustration) is more likely to be associated with a greater risk for alcohol-related problems than is drinking for other reasons, such as to be sociable (Abbey, Smith & Scott, 1993; Carpenter & Hasin, 1998; Cooper et al., 1998). Cognitive models (Hull, 1981; Sayette, 1993; Steele & Josephs, 1988;1990) suggest that alcohol can attenuate negative affect through its blocking of threat appraisals and negative cognitions. Certain types of threatening event may be more likely to lead to alcohol consumption. Higgins & Marlatt (1973; 1975) found that the anticipation of interpersonal evaluation was a trigger for increased alcohol consumption whereas the threat of an electric shock was not, therefore, it may be that drinking responses are triggered by threats to self-esteem. Similarly, the models of Hull (1981) and Steele & Josephs (1988; 1990) also focus on psychosocial threats to self-concept. However, it may be too early to dismiss drinking in response to physical threat. Indeed, Sayette (1993) includes both psychosocial and physical precipitants in his model; and alcohol reduces affect when faced with physical threat (e.g., Noel, Lisman, Schare, Maisto, 1992).

Despite this evidence, there is little research on how problem drinkers cognitively process threatening information. However, applying information-processing models from other disorders might aid understanding of the possible role of threat processing in problem drinking. For example, two cognitive processing phenomena are seen to occur in anxiety disorders. Attentional biases are seen when individuals preferentially attend to perceptual cues associated with their current concern (Williams, Watts, MacLeod & Mathews, 1988), and cognitive avoidance takes place where an individual attempts to avoid processing of this material in an effort to reduce emotional discomfort (Mogg, Mathews & Weinman, 1987). Beck & Clark (1997) link these processes together in a model of threat processing with attentional biases at the initial (automatic) stages and cognitive avoidance in the later (strategic) stages of threat processing. Such avoidance may maintain anxious symptoms as it prevents realistic appraisal and habituation to threat cues (Foa & Kozak, 1986). Beck & Clark's (1997) formulation concurs with others (e.g., Amir, Foa & Coles, 1998; Mogg & Bradley, 1998).

Attentional biases have been investigated predominantly using the emotional Stroop task (based on Stroop, 1935). In anxiety, studies have shown that individuals demonstrate biases towards threatening information related to their specific disorder (e.g., Foa, Feske, Murdock, Kozak & McCarthy, 1991; Mathews & MacLeod, 1985; Watts, McKenna, Sharrock & Trezise, 1986). Cognitive avoidance has been suggested to account for studies where anxious individuals appear to lack a memory bias for threat (Mogg et al., 1987). Amir et al. (1998) found an attentional bias and cognitive avoidance pattern for threat material in a homograph decision paradigm, but this was not found by Mogg, Bradley, de Bono & Painter (1997), using a visual

dot-probe task. Outside of anxiety disorders the investigation of these phenomena has been predominantly applied to attentional biases to disorder-related information. In Stroop studies across disorders, individuals have demonstrated attentional biases for information specific to their disorder, e.g., gamblers (McCusker & Gettings, 1997), suicide attempters (Becker, Strohbach & Rinck, 1999) and eating disorder patients (Perpiñá, Hemsley, Treasure & de Silva, 1993).

In the alcohol field, Stroop studies have found that (newly abstinent) alcohol dependent individuals demonstrate attentional biases to alcohol-related stimuli (Johnsen, Laberg, Cox, Vaksdal & Hugdahl, 1994; Stetter, Ackermann, Bizer, Straube & Mann, 1995; Stetter, Chaluppa, Ackermann, Straube & Mann, 1994). Stetter et al. (1994; 1995) suggested that the extent of disorder-related processing could be related to the degree of alcohol dependence. Johnsen et al. (1994) suggest that attentional resources are preferentially allocated to alcohol cues. They suggest that alcohol stimuli are more salient because of previous alcohol-related experiences and alcohol outcome expectancies. It is proposed that such attentional biases lead to increased distraction of alcohol cues. This may result in intense preoccupations with alcohol and increase drinking urges and thus, could be a maintenance factor in continued use when not abstinent, or increase the likelihood of relapse if abstinent (Johnsen et al., 1994). This view of the consequences of attentional bias is similar to that in opiate addiction (Lubman, Peters, Mogg, Bradley & Deakin, 2000).

Research into cognitive avoidance is generally sparse (Meyer, Serpell, Waller, Murphy, Treasure & Leung, under consideration), especially in the field of alcohol use and abuse. Tiffany (1990) suggested abstinent individuals need to employ nonautomatic cognitive processes and behaviours to inhibit (often automatic)

drug use behaviours that may be triggered by alcohol stimuli - such strategies include avoiding activating the stimuli. In the light of this, Stormark, Field, Hugdahl & Horowitz (1997) proposed that on meeting alcohol stimuli, abstinent alcohol dependent drinkers would initially show selective processing of alcohol cues (attentional bias). However, after the initial recognition of stimuli abstinent individuals would try to disengage from further processing to prevent the likelihood of alcohol consumption and urges. In support of this Stormark et al. (1997) demonstrated attentional bias followed by cognitive avoidance to alcohol-related cues in a visual dot-probe task with abstinent alcohol dependent individuals. However, Stormark et al. (1997) did not investigate whether individual factors (such as severity of dependence) moderated the extent of the bias.

Outside of the anxiety disorders, although there is evidence of cognitive processing biases for disorder-related information, there has been limited research into cognitive processing of general threat stimuli. However, McManus, Waller & Chadwick (1996) found an attentional bias toward general threat cues (particularly self-esteem threats) for patients with bulimia nervosa. Furthermore, using an anagram task that explicitly required the strategic processing of the threat material, Waller & Meyer (1997) found an association between bulimic attitudes and cognitive avoidance of self-esteem threatening stimuli. Similarly, Meyer et al. (under consideration) found cognitive avoidance to self-esteem threats in bulimia patients compared to non-disordered individuals. These studies also found that the extent of attentional bias and cognitive avoidance of threat were dimensionally linked to bulimic traits.

It can be hypothesised that both attentional bias and cognitive avoidance of self-esteem threat will occur in problem drinking since a function of drinking behaviour might be to avoid processing threatening information (thereby reducing negative affect). However, the alcohol field has not addressed attentional biases and cognitive avoidance of both disorder-specific and general threat information. Therefore the present study examined initial attentional bias to and subsequent cognitive avoidance of both threat-related and disorder-related cues hypothesising that these biases would be greater in problem than in non-problem (social) drinkers. A second aim was to investigate whether the extent of these biases correlated with severity of alcohol dependence. It was predicted that the extent of attentional bias towards alcohol-related and threat-related cues would be positively associated with severity of alcohol dependence. Similarly, it was predicted that the extent of cognitive avoidance to alcohol-related and threat-related cues would be positively associated with severity of alcohol dependence.

## **Method**

### Design

Two designs were used to address the hypotheses. For each dependent variable (attentional bias and cognitive avoidance), a between-group comparison was used, contrasting a group of problem drinkers and a non-clinical control group of social drinkers. Second, a within-group correlational design was used to test the dimensional hypotheses.

### Participants

The participants were a clinical group of 30 problem drinkers and a control group of 30 non-problem drinkers. In order to fulfil preconditions of the alcohol

dependence measure that was administered, all participants had to have had at least one alcoholic drink in the past six months. The two groups were matched for gender, age and verbal intelligence. The general inclusion criteria were as follows: over 18; English as a first language; no reported dyslexic problems; no reported visual acuity impairment (not rectifiable by glasses); and no disturbance of colour perception (measured by the 6-plate, short version of the 38-plate Ishihara colour-blindness test - Ishihara, 1964). The research received appropriate local ethical approval (Appendices C and D). All participants were informed of the purpose of the study, and were given the opportunity to ask questions. The confidentiality of their responses was assured. All participants were given the opportunity to refuse to participate or (in the case of the clinical group) to withdraw at any stage without affecting treatment (see information sheet, Appendix E). Each participant was required to sign a consent form (Appendix F) and had the opportunity to receive feedback about the study (Appendix G).

Clinical group. All of these participants had met criteria for DSM-IV diagnosis of alcohol dependence (American Psychiatric Association, 1994) in the previous year. This was established in a semi-structured interview (Appendix H, based on a checklist of DSM-IV criteria for alcohol dependence) and from diagnostic information gathered from the patient's medical file. Further, the participants had to score 8 or over on the Alcohol Use Disorders Identification Test (AUDIT, Saunders, Aasland, Babor, de la Fuente & Grant, 1993), based on their drinking habits before abstinence (see Measures). At the time of testing the participants had been abstinent for at least four weeks to allow for cognitive recovery from alcohol withdrawal (Knight & Longmore, 1994). None of the group was currently using other illicit

drugs, and none had met DSM-IV criteria for substance dependence in the present or past, according to self-report and medical files. The clinical group was recruited from a six-week out-patient abstinence treatment programme for alcohol dependence. The investigator attended open meetings in the abstinence day-programme and asked for volunteers. Twelve individuals were screened out of the study. These consisted of: three who had drunk alcohol in the previous four weeks; five who had not drunk alcohol for more than six months; two who were colour-blind; one who had reported dyslexia; one whose first language was not English. In addition one person declined to take part.

Control group. None of the comparison group met DSM-IV criteria for past or present alcohol dependence or abuse. The participants were screened, using the same semi-structured interview as the problem drinkers (Appendix H). The comparison group also had to score 7 or less on the AUDIT. No person reported any current or past history of problem substance use. The comparison group was recruited from within the health service and from personal contacts of the investigator. None of the participants approached in the control group refused to take part or failed to meet other inclusion criteria.

### Measures

In addition to the two experimental tasks, three questionnaires were given to the two groups - a measure of verbal intelligence and two measures of alcohol use. One alcohol measure (AUDIT) was given specifically to differentiate the two groups in terms of harmful and non-harmful drinking patterns, and thus was used only in setting the inclusion/exclusion criteria. The second measure (SADQ-C) was used to enable the dimensional hypotheses to be tested.



Mill Hill Vocabulary Scale (MHV; Raven, Raven & Court, 1997). The MHV (Appendix I) was used to provide an index of intelligence in order to compare the two groups. The 'All Multiple Choice – Senior' version of the measure was used. Higher scores indicate higher levels of intelligence (Raven, Raven & Court, 1998).

Alcohol Use Disorders Identification Test (AUDIT; Saunders et al., 1993). This questionnaire (Appendix J) is a screening instrument, designed to detect hazardous and harmful drinking habits before dependence has occurred. It is a ten-item scale, covering alcohol intake, aspects of alcohol dependence, adverse reactions to drinking and alcohol-related problems. Items are scored from 0 – 4. A higher score (range = 0 - 40) indicates higher levels of hazardous or harmful drinking and a score of 8 or more indicates a strong likelihood of hazardous or harmful drinking consumption which merits further investigation (Conigrave, Hall & Saunders, 1995; Saunders et al., 1993). The AUDIT has been shown to be a valid measure across countries (Saunders et al., 1993), in males and females, and in multi-ethnic samples (Volk, Steinbauer, Cantor & Holzer, 1997). In the present study the clinical group were asked to respond in relation to their drinking pattern pre-abstinence.

Severity of Alcohol Dependence Questionnaire Form-C (SADQ-C; Stockwell & Sitharthan, 1991; Stockwell, Sitharthan, McGrath & Lang, 1994). This measure (Appendix K) was used to provide a measure of the severity of alcohol dependence across the two groups in order to investigate whether their level of dependence was associated with extent of attentional bias or cognitive avoidance. The SADQ-C is based on the Severity of Alcohol Dependence Questionnaire (SADQ, Stockwell, Hodgson, Edwards, Taylor & Rankin, 1979) which was aimed solely at clinic samples of problem drinkers. The SADQ-C was devised for community samples of

drinkers where heavy drinking or the experience of alcohol-related problems cannot be presumed. A stipulation of administration is that some alcohol must have been consumed in the previous six months. The SADQ-C is a 20-item measure covering key features of the alcohol dependence syndrome (World Health Organisation, 1977) such as physical withdrawal, affective withdrawal, craving, withdrawal relief drinking, typical daily alcohol consumption, and reinstatement of symptoms after a period of abstinence. Responses are scored 0 - 3. A higher score (range = 0 - 60) indicates a higher level of alcohol dependence. For non-clinical samples, only the first 16 items are administered (omitting items relating to reinstatement), and the total remaining score is pro-rated (multiplying by 1.25) to be comparable with clinic samples (Stockwell et al., 1994). On both the SADQ and the SADQ-C scores of 31 and above can be regarded as indicating severe alcohol dependence (Stockwell et al., 1979; Stockwell & Sitharthan, 1991). The SADQ-C has high concurrent validity with the SADQ (which has good validity in clinic samples - Meehan, Webb & Unwin, 1985; Stockwell, Murphy & Hodgson, 1983), and high internal reliability in both clinic and community samples (Stockwell et al., 1994). The clinical group was asked to complete the questionnaire in relation to their drinking pattern pre-abstinence.

Stroop task. Attentional bias was assessed in a modified version of the Stroop task (Stroop, 1935). Participants completed two Stroop tasks (two lists each), in each task the participant had to colour-name aloud two lists of words, while ignoring the content of the word. One of the two lists consisted of either ego-threat or alcohol-related words, while the other consisted of neutral words. The stimuli in the neutral word list were matched as far as possible to the threat/alcohol word list for

frequency, initial letter and word length (using the criteria of Johansson & Hofland, 1989). Each of the four lists consisted of eight words used 12 times each and printed in red, blue, green or black. Each word appeared in each colour three times. The words were arranged in a 4 x 24 matrix and were colour-named down the columns. The stimulus order was random for each list but no word or colour was repeated immediately next to each other in a column. The words were written in block capitals, approximately 0.5 cm high. Participants were asked to name the colour of each word and ignore the content. They were asked to go as fast as they could without making errors but to ignore any mistakes made and to carry on. The total time taken for the participant to colour-name all the words on each of the four lists was recorded with a stopwatch. To familiarise participants with the Stroop task each participant was given a practice card (consisting of varying length strings of the letter 'O') and each string was printed in one of the four colours. The four target cards were presented next. The presentation of the cards was partially counterbalanced using a 6 x 4 Latin square design (Kirk, 1968). A short break was given between lists to minimise fatigue effects.

The four groups of words were alcohol-related, alcohol-control, ego-threat, and ego-threat control. Alcohol words were taken from previous alcohol Stroop studies (e.g., Johnsen et al., 1994) or were generated through discussion with colleagues working in the alcohol field. The ego-threat words were selected from McManus et al. (1996) where ego-threat words were operationalised as self-generated threats to the individual's self-esteem.

Ego-threat words: failure, stupid, ugly, inadequate, bad, inferior, worthless, defeated.

Ego-threat control words: flowers, skilled, urban, innumerable, bit, immortal, wavering, deciding.

Alcohol-related words: pint, beer, drunk, lager, pub, whisky, hangover, cider.

Alcohol control words: poll, beat, dusty, lanky, par, wallet, hatching, cedar.

It is hypothesised that the time taken to name a word's colour is longer if the word is personally relevant to the individual compared to a non-salient (e.g., neutral) word, thus demonstrating an attentional bias (Lavy, van Oppen & van den Hout, 1994; McNally, Kaspi, Riemann & Zeitlin, 1990; Williams, Mathews & Macleod, 1996). 'Interference scores' were calculated by subtracting the time taken to colour-name each control list from the time taken to colour-name the corresponding salient list. The higher the (positive) interference score, the greater the attentional bias towards the salient information.

Anagram task. An anagram-solving task was used as the measure of cognitive avoidance. This measure had been used by Waller & Meyer (1997) and Meyer et al. (under consideration). In Beck & Clark's (1997) model cognitive avoidance occurs when strategic, detailed processing takes place, therefore, the cognitive avoidance of stimuli may be demonstrated on a task requiring this processing. Waller and colleagues suggest that the anagram task requires this explicit processing of stimuli. The anagrams were established using a similar method to Waller & Meyer (1997). Prior to the main body of the study, 20 non-problem drinkers (ten males, ten females) were asked to solve a large set of anagrams to provide normative solution times, fifty-two anagrams were used (22 neutral, 14 alcohol-related words, and 16 ego-threat words). These anagrams all had unique solutions. The alcohol words and neutral words were either generated for the study or came from previous studies

(e.g., Johnsen et al., 1994; Meyer et al., under consideration). Ego-threat words were taken from Meyer et al. (under consideration) or were chosen on the basis of their apparent association with McManus et al.'s (1996) operationalised definition of ego-threat. Each word was written in lower case (approximately 0.5 cm high) on a separate card and the cards were presented in random order to the 20 individuals. A ceiling score of 60 seconds was given if the individual could not solve the anagram within 60 seconds. After calculating the mean solution time for each word, six unique solution anagrams from each category were chosen so that the mean solution time for each set was equivalent. The word sets used in the main study were as follows:

Ego-threat word anagrams: neloa = alone, lfia = fail, budm = dumb, ludl = dull, neloly = lonely, and temyp = empty (mean solution time of 14.9 seconds per word).

Neutral word anagrams: tawhc = watch, sheou = house, ribkc = brick, gfal = flag, eivw = view, and l heo = hole (mean solution time of 14.1 seconds per word).

Alcohol-related words: qiluor = liquor, ispisrt = spirits, zoboe = booze, shsake = shakes, rnabdy = brandy, and urm = rum (mean solution time of 14.4 seconds per word).

For the main experiment the 18 chosen anagrams were presented in random order and in the same format as before. The time taken to reach the correct solution and name the word aloud was recorded with a stopwatch. If participants could not solve an anagram in 60 seconds, this time limit was used as their score. Cognitive avoidance was indicated if participants took longer to solve the sets of content-salient

anagrams (threat- or alcohol-related words) than control matched (neutral) words. To find the time discrepancy, the time taken to solve the neutral set of anagrams was subtracted from the time taken to solve the ego-threat or alcohol-related anagrams. Therefore, the larger (more positive) the time discrepancy, the greater the cognitive avoidance. The participants were given two practice (untimed, neutral) anagrams to familiarise themselves with the task. These words were *uby* (= buy), and *kawl* (= walk). Next they completed the 18 anagrams (presented in a random order).

### Procedure

Participants were seen individually for approximately 45 minutes. There were standardised instructions for each task (Appendices L and M). In each group participants were presented with either the Stroop or the anagram task first (counterbalanced order). These tasks were presented before the semi-structured interview and administration of the SADQ-C, AUDIT and MHV (in order to avoid cognitive priming by these later measures).

### Data analysis

Kolmogorov-Smirnov tests were used to test the normality of the distributions of the two samples' scores in order to determine whether parametric or non-parametric statistics could be used. The categorical hypotheses were analysed using parametric statistics using ANOVAs and *t*-tests (correcting for unequal variances where appropriate) using mean colour-naming times and the interference scores in the Stroop task and the mean anagram solution time per set and discrepancy scores in the anagram task. The dimensional hypotheses were analysed using non-parametric correlations (Spearman's  $\rho$ ). Two-tailed tests were used throughout.

## Results

### Group characteristics

Most of the two groups' scores met criteria for a normal distribution (Kolmogorov-Smirnov test;  $z < 1.33$ ; NS in all cases). The exception to this was the distribution of the scores for the SADQ-C for the control group only (pro-rated SADQ-C;  $z = 1.50$ ,  $p < .05$ ; full SADQ-C;  $z = 1.62$ ,  $p < .05$ ). Where the Levene's test indicated variances of distributions were unequal, t-tests were used which took account of unequal variances. The fact that the sample sizes were equal and that the t-test is robust justified the use of this test (Howell, 1997).

Table 1 shows the characteristics of the two groups. They were well matched on gender (six women and 24 men in each group), age and MHV scores. As expected, the groups differed significantly on the alcohol-related measures (AUDIT; SADQ-C). On the AUDIT, the control group's scores (range 1-7) did not indicate harmful or hazardous alcohol use while the clinical group had a much higher mean score and range (16 – 40). The clinical group had been abstinent for significantly longer (a requirement of the inclusion criteria and of the treatment centre) than the control group (who were not required to be abstinent). Before their abstinence, the clinical group drank significantly more units of alcohol per week than the comparison group.

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Insert Table 1 about here

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Attentional bias

Table 2 shows the mean time (in seconds) taken by each group to colour-name each of the four Stroop cards and the two 'interference scores'. The Kolmogorov-Smirnov tests showed that distributions of both mean colour-naming times and interference scores did not differ significantly from normality and therefore, parametric statistics could be used ( $z < 1.11$ ; NS in all cases). A repeated-measure analysis of variance was performed using the mean colour-naming times with two within-subject factors of content (threat or alcohol) and salience (salient or neutral word condition) and one between-subject factor of group. There was a significant main effect of salience ( $F(1, 58) = 47.6$ ;  $p < .001$ ) and significant two-way interactions of group  $\times$  salience ( $F(1, 58) = 6.30$ ;  $p < .05$ ) and salience and content ( $F(1, 58) = 7.40$ ;  $p < .01$ ). Most importantly, the three-way interaction of group  $\times$  content  $\times$  valence approached significance ( $F(1,58) = 3.73$ ;  $p < .06$ ). To clarify the latter results separate ANOVAs were carried out for each type of word content. A 2  $\times$  2 ANOVA (threat vs control words)  $\times$  group (control vs clinical) did not find a significant group  $\times$  word interaction ( $F < 1$ ; NS). However, a 2  $\times$  2 ANOVA (alcohol vs control words)  $\times$  group (control vs clinical) did find a significant group  $\times$  word interaction ( $F(1,58) = 9.10$ ;  $p < .01$ ). Subsequent  $t$ -tests of interference scores found that the clinical group had significantly larger interference times (for alcohol relative to neutral words) than the control group ( $t(58) = 3.02$ ;  $p < .05$ ) using Bonferroni's correction for multiple tests. However, there was no such effect for the ego-threat interference scores ( $t(58) = 0.49$ ; NS). Therefore, the clinical group showed a larger interference effect than the control group for alcohol words. This effect was not found for ego-threat cues (see Table 2 for means).



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Insert Table 2 about here

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#### Association of attentional bias and severity of alcohol dependence

As the distribution for SADQ-C scores was not normal in the control group, all the correlations for the dimensional hypotheses used nonparametric statistics (Spearman's  $\rho$ ). Although it had been predicted that larger interference scores for both alcohol and ego-threat-related words would be associated with higher alcohol dependency scores, this was not found for either group. Age was positively associated with alcohol interference scores for the control group. There was a negative association between alcohol 'interference' scores and typical weekly alcohol consumption for the clinical group.

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Insert Table 3 about here

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#### Cognitive avoidance

Table 4 shows the mean time to solve each anagram within each set by the two groups. As Kolmogorov-Smirnov tests were not significant ( $z < 1.00$ ; NS in all cases), parametric analyses (t-tests) were used. There were no significant differences between the two groups' mean times taken to solve each of the six anagrams in each set. Therefore, the two groups did not differ in speed of processing. Nor were there any significant differences between the two groups' discrepancy times for either the

alcohol or the ego-threat anagrams. Therefore, the two groups did not differ in their cognitive avoidance for alcohol or ego-threat information.

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Insert Table 4 about here

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An ANOVA (group x type of anagram) showed no effect of group ( $F < 1$ ; NS) and no interaction of group x type of anagram ( $F(2, 57) = 1.64$ ; NS). However, there was an effect of type of anagram ( $F(2, 57) = 20.8$ ;  $p < .001$ ), which was due to significant differences (LSD test;  $p < .05$  in all cases) between all three conditions. Thus, all participants (regardless of group) took significantly longer to solve the neutral anagrams than the alcohol anagrams, and took significantly longer to solve the ego-threat anagrams than the neutral anagrams. These findings suggest a general slowing of processing of ego-threat and a more rapid processing of alcohol-related information, but fail to support the prediction that the clinical group would show greater cognitive avoidance of ego-threat and alcohol words than the control group.

#### Association of cognitive avoidance and severity of alcohol dependence

Table 5 shows the association of individual characteristics (including alcohol dependence) with discrepancy scores (extent of cognitive avoidance). There was a significant negative association between the control group's alcohol discrepancy scores and their SADQ-C score. Their discrepancy score was also significantly negatively related to their alcohol intake. Thus, the more the control group used alcohol and were more alcohol dependent, the faster they were to solve alcohol

anagrams compared to neutral anagrams. In the clinical group, there was no association between their discrepancy score and the severity of alcohol dependence. In terms of the ego-threat anagrams there was only one significant correlation. The control group's pro-rated SADQ-C score was negatively associated with their discrepancy score for ego-threat anagrams. Therefore, the more severely alcohol dependent they were, the faster they were to solve ego-threat anagrams compared to neutral anagrams. There was no relationship between discrepancy scores for ego-threat anagrams and severity of dependence in the clinical group.

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Insert Table 5 about here

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### **Discussion**

The results show that, as predicted, the clinical group took significantly longer than the control group to colour-name alcohol words compared to neutral words (attentional bias), however, a similar pattern was not found for the self-esteem threat words. In the anagram task the two groups solved anagram sets in similar times. Threat anagrams were solved more slowly than neutral anagrams and alcohol anagrams more quickly than neutral anagrams. However, the clinical group did not take significantly longer than the control group to solve alcohol-related and self-esteem anagrams compared to neutral anagrams. Therefore, the two groups did not differ in cognitive avoidance of alcohol and self-esteem threat information.

### Findings on attentional bias

As regards alcohol stimuli, the significant finding supports previous studies (Johnsen et al., 1994; Stetter et al., 1995). This is consistent with Stroop studies in other disorders that have found a processing bias to disorder-related words (e.g., McCusker & Gettings, 1997; Perpiñá et al., 1993). Johnsen et al. (1994) suggest that this result reveals an attentional bias, representing the clinical group's preferential processing of alcohol-related stimuli. Alcohol cues are said to become salient due to a history of alcohol-related experiences and alcohol expectations. The 'attention-grabbing' nature of the alcohol words may lead to a narrowing of processing, focusing on thoughts and feelings concerning alcohol stimuli. This increased salience of alcohol stimuli and alcohol preoccupations may be a factor in continued alcohol use or relapse (Johnsen et al., 1994).

In contrast, the findings failed to confirm that attentional biases may occur towards self-esteem threat stimuli. Therefore, selective attention to self-esteem threat may not have a role to play in understanding alcohol dependence.

In terms of dimensional relationships there was no association between the extent of disorder-related processing and the measure of severity of alcohol dependence (SADQ-C). Therefore, the links between disorder-related processing (attentional bias) and severity of alcohol dependence appear to exist only at the categorical level, rather than at the dimensional level. Furthermore, the severity of alcohol dependence was not associated with the extent of threat-related processing, lending weight to the conclusion that threat processing is not associated with alcohol dependence.

### Findings on cognitive avoidance

There were no differences in processing between the two groups in terms of solution times to solve threat and alcohol anagrams compared to neutral ones. Therefore, cognitive avoidance of alcohol and threat words was not seen in the clinical group compared to the control group. Both groups demonstrated more rapid processing of alcohol words and slower processing of self-esteem threat words. Turning to alcohol-related words first, these results fail to support Stormark et al.'s (1997) suggestion that abstinent drinkers would show strategic avoidance of alcohol stimuli. This finding may be surprising in the light of Stormark et al.'s (1997) finding and Tiffany's model (1990), which suggests alcohol stimuli are avoided to impede the likelihood of triggering alcohol use behaviour. The present results suggest that abstinent drinkers do not generally engage in strategic cognitive avoidance of alcohol stimuli.

The lack of difference between the two groups in solving self-esteem threat anagrams indicates that problem drinkers do not appear to cognitively avoid this type of threat stimuli any more than non-problem drinkers. Therefore, again, the processing of self-esteem threats does not appear to be relevant to alcohol dependence psychopathology.

In the clinical group increased severity of alcohol dependence was unrelated to the extent of avoidance of alcohol cues, therefore, severity of alcohol problems did not impact on ability cognitively to avoid stimuli. In the control group, higher levels of alcohol dependence led to faster processing of alcohol cues. Perhaps without motivation to avoid the stimuli, more rapid processing of stimuli occurs the more an individual is alcohol dependent.

As for self-esteem threat words, the prediction that the increased severity of alcohol dependence would be related to a greater impairment to solve self-esteem threat anagrams was unsupported. Indeed, in the control group, more severe dependence was associated with less likelihood of slower self-esteem threat anagram solving. Therefore, threat processing may not be associated with greater alcohol dependence, which would bring further evidence against threat processing being of importance to alcohol dependence.

### Limitations

There are methodological issues that need to be taken into account when interpreting this study's findings. The study controlled for some key variables, such as age, gender, IQ and withdrawal from alcohol, however, future studies could control for anxiety or depression between the groups, which might have impacted on the findings. In the statistical analysis, although there were specific hypotheses for the correlations, however, a limitation is that the large number of correlations in the relatively small samples may have increased the risk of spurious significant findings.

With regard to the study's aim to address threat processing in alcohol dependence, there are several explanations for the lack of evidence from either of the two paradigms. It may be that threat processing is not a core part of alcohol dependence psychopathology. However, it may be that the paradigms were not sensitive enough to demonstrate significant effects. Improvements could include using larger samples and clarifying the results in alternative paradigms. Another possibility in the failure to support the threat hypothesis is that alcohol dependent drinkers may be sensitive to different forms of threat rather than the self-generated self-esteem threat used in the study. Future studies could look at a range of

threatening material (e.g., physical, sociotrophy or autonomy threats - McManus et al., 1996). Furthermore, threat processing may only be an issue for certain subsets of problem drinkers. For example, it might be that initial attentional bias and subsequent cognitive avoidance of threat processing are found only in those who predominantly drink to cope, or who have particular coping styles (e.g., avoidant/emotion-focused - Cooper et al., 1988).

In the Stroop task the lack of control groups and control word categories may mean that significant findings should be interpreted with caution. Alternative groups (e.g., spouses or alcohol workers) could have been used to control for the possibility that the clinical group were not just reacting to general emotional associations with (or increased semantic knowledge of) alcohol stimuli (McCusker & Gettings, 1997). Extra word categories controlling for specificity of bias to alcohol words (such as semantically-related, other drug and general emotional words) would have made the paradigm more robust.

Furthermore, it should be noted that the Stroop paradigm, although popular, may be an ambiguous measure of attention (Lubman et al., 2000). Other interpretations for the Stroop task exist. For example, Stetter et al. (1995) suggest that alcohol cues activate highly elaborate alcohol schema, which require more processing capacity and lead to task-irrelevant processing, limiting resources for the colour-naming task. The latent colour-naming may even be due to a defensive response to shut out negative information (de Ruiter & Brosschot, 1994), although this is disputed by Williams, Watts, MacLeod & Mathews (1997). An alternative explanation is that the interference on the Stroop task could be due to a response

selection bias as opposed to an attentional bias (Lubman et al., 2000; Mogg & Bradley, 1998).

The anagram task may have been limited in design, thus influencing findings. For example, the pattern of solution times may indicate that the prior attempt to equate the solution times of the word sets was not achieved. The alcohol category words may have been easier to guess, thus priming participants and contributing to faster solution times. Improvements could involve including more distracter words to reduce the possibility of recognition of some categories and not others.

Finally, the relatively novel anagram task may be an ambiguous measure of strategic cognitive avoidance. It may be questioned whether the task primarily involves strategic processing of word content in order to find a solution. For example, within the task there is the possibility that both automatic and strategic processing of word content affects solution times. Whilst the anagram is being solved it may be that both automatic and strategic processing are responsible. For example, alcohol- or threat-related words (that may fit the solution) may come to mind automatically, but then be suppressed not only by an avoidance strategy but also by an unwillingness to report the word (i.e. a response bias against solutions, in order to make a favourable impression on the experimenter). These possibilities throw doubt on whether anagram solution time is a sensitive measure of cognitive avoidance of strategic processing of word content. Therefore, more systematic study of the paradigm's delivery and theoretical underpinnings would be beneficial.

### Implications

Clinically, it may prove beneficial to aim to reduce attentional biases to alcohol cues, thus reducing the difficulty of resisting urges to drink. Strategies could



include exposure and habituation to the stimuli. Alternatively, methods to avoid acting on alcohol drinking behaviours that may be triggered by stimuli could be reinforced (as seen in the relapse prevention procedures of Marlatt & Gordon, 1985). Those methods might include employing behavioural strategies such as avoiding or changing the stimulus situation. Cognitive strategies could include trying to delay or prevent drinking by focusing on the negative consequences of alcohol use and the benefits of not drinking.

Further research is needed to investigate attentional biases to alcohol stimuli, for example, by gaining convergent evidence from other attentional bias paradigms that relate to different cognitive systems. Invariably, attentional biases have been investigated in abstinent, male drinkers, therefore, delineating the phenomena across genders and across current and abstinent drinkers (of varying problem severity) would be informative. Longitudinal studies could explore the stability of attentional biases, and their role as a vulnerability factor for relapse. Since in anxiety disorders attentional biases to concern-relevant information are seen to occur at an early stage of processing and involve automatic processes (Mogg, Bradley, Williams & Mathews, 1993), it may be that attentional biases in alcohol dependence are similar. Therefore, employing subliminal versions of paradigms (with brief, masked presentations of stimuli) to assess initial automatic processing, occurring before conscious awareness, would be invaluable to extend current knowledge. Further, it may be that the performance on attentional bias tasks, that assess cognitive processing of alcohol stimuli, could be an indicator of alcohol dependence, thus, escaping problems inherent in self-report measures. However, more research will be needed to validate measures for such a role, including the Stroop task. Regarding

cognitive avoidance of alcohol cues, Stormark et al.'s (1997) study needs to be replicated and extended including the use of different cognitive avoidance paradigms (e.g., Amir et al., 1998).

While this study has demonstrated specific patterns of cognitive processing in abstinent alcohol dependent individuals, it is clear that there is still much more research needed before one can reach firm conclusions. That research will need to draw together a relatively diverse literature, and to embed it in the broader cognitive-behavioural literature.

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Table 1. Characteristics (mean and SD) of each group including age, Mill Hill Vocabulary Scale (MHV), Alcohol Use Disorders Identification Test (AUDIT), weekly alcohol consumption, length of abstinence and Severity of Alcohol Dependence Questionnaire-Form C (SADQ-C).

	Group		t-test	
	Control	Clinical	t	p (2-tailed)
N	30	30		
Age (years)	44.6	43.4	0.42	<u>NS</u>
(SD)	(11.3)	(10.7)		
MHV	62.7	60.0	1.16	<u>NS</u>
(SD)	(8.70)	(9.27)		
AUDIT	4.93	31.3	23.3 <sup>a</sup>	.001
(SD)	(1.86)	(5.93)		
Weekly alcohol units	9.82	234.0	10.1 <sup>a</sup>	.001
(SD)	(7.18)	(122.0)		
Length of abstinence (days)	2.93	54.5	8.13 <sup>a</sup>	.001
(SD)	(2.77)	(34.6)		
SADQ-C (full score)	2.63	31.7	14.0 <sup>a</sup>	.001
(SD)	(3.96)	(10.7)		
SADQ-C (pro-rated)	1.42	31.2	14.5 <sup>a</sup>	.001
(SD)	(2.20)	(11.0)		

<sup>a</sup> Equal variances not assumed

Table 2. Mean colour-naming time (seconds) for each Stroop task, and mean 'interference scores' (seconds) for each group.

Stroop task	Group	
	Control	Clinical
Alcohol	78.3	85.3
(SD)	(20.4)	(21.4)
Alcohol-control	78.3	78.7
(SD)	(21.1)	(15.2)
Alcohol interference	-0.07	6.58
(SD)	(6.44)	(10.2)
Ego-threat	81.5	85.3
(SD)	(20.8)	(16.1)
Ego-threat-control	74.7	77.6
(SD)	(17.3)	(17.4)
Ego-threat interference	6.75	7.73
(SD)	(7.14)	(8.42)

Table 3. Associations (2-tailed Spearman's  $\rho$ ) of attentional bias to ego-threat and alcohol cues (Stroop interference scores) with individual characteristics (age, Mill Hill Vocabulary Scale, MHV) and with alcohol use and dependence (length of abstinence, alcohol consumption, Severity of Alcohol Dependence-Form C, SADQ-C). SADQ-C scores are used only where relevant to original group (see Measures).

<u>Stroop task</u>	Alcohol		Ego-threat		
	<u>Group</u>	Control	Clinical	Control	Clinical
Age		.41*	-.11	-.28	.06
MHV		.21	-.29	-.10	-.01
Length of abstinence (days)		-.04	-.17	.02	.17
Weekly units of alcohol		-.15	-.41*	.12	-.09
SADQ-C (full score)		-	-.30	-	.13
SADQ-C (pro-rated)		-.10	-	.18	-

\*  $p < 0.05$

Table 4. Mean time (seconds) taken to solve each anagram within different sets and 'discrepancy scores' (seconds) for each group.

	<u>Group</u>		<u>t-test</u>	
	Control	Clinical	<u>t</u>	<u>p (2-tailed)</u>
Anagram task	<hr/>			
Alcohol	12.5	13.4	0.42	<u>NS</u>
( <u>SD</u> )	(6.97)	(9.15)		
Ego-threat	22.1	18.8	1.19	<u>NS</u>
( <u>SD</u> )	(9.56)	(11.7)		
Neutral	17.4	16.9	0.13	<u>NS</u>
( <u>SD</u> )	(12.5)	(13.2)		
Alcohol discrepancy	-4.82	-3.51	0.52	<u>NS</u>
( <u>SD</u> )	(9.86)	(9.62)		
Ego-threat discrepancy	4.71	1.86	1.10	<u>NS</u>
( <u>SD</u> )	(9.00)	(11.0)		

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Table 5. Association (2-tailed Spearman's  $\rho$ ) of cognitive avoidance to threat and alcohol words (anagram discrepancy scores) with individual characteristics (age, Mill Hill Vocabulary Scale, MHV) and with alcohol use and dependence (length of abstinence, alcohol consumption, Severity of Alcohol Dependence-Form C, SADQ-C). SADQ-C scores are used only where relevant to original group (see Measures).

Anagram task Group	Alcohol		Ego-threat	
	Control	Clinical	Control	Clinical
Age	.06	.13	.33	.21
MHV	.20	-.07	.23	-.04
Length of abstinence (days)	.08	.21	-.04	.15
Weekly units of alcohol	-.50**	.23	-.33	.21
SADQ-C (full score)	-	.32	-	-.06
SADQ-C (pro-rated)	-.45*	-	-.44*	-

\* $p < 0.05$ ; \*\*  $p < 0.01$

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**Appendix A**

**Instructions to authors - Cognitive Therapy and Research**



## Instructions to Contributors: Cognitive Therapy and Research

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**Appendix B**

**Instructions to authors – Addiction**

# Addiction

The journal fully supports the "Farmington Consensus" (*Addiction*, 1997, 92, 1617–1618).

## Guidance to Authors

The editorial staff will be most grateful for your assistance in relation to the matters listed below. Please follow this guidance carefully when preparing a submission.

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Manuscripts are accepted on the understanding that they are subject to editorial revision. Submissions must be accompanied by a signed statement from all authors saying that: (a) the material has not been published in whole or in part elsewhere; (b) the paper is not currently being considered for publication elsewhere; (c) all authors have been personally and actively involved in substantive work leading to the report, and will hold themselves jointly and individually responsible for its content; (d) all relevant ethical safeguards have been met in relation to patient or subject protection, or animal experimentation. This statement must also declare sources of funding, direct or indirect, and any connection with the tobacco, alcohol or pharmaceutical industries. With regard to points (a) and (b): if data from the same study are reported in more than one publication, this should be stated in the manuscript and/or covering letter to the editor, along with a clear explanation as to how the submitted manuscript differs, and copies of closely related manuscripts reporting these data should be enclosed. If at any stage during the handling of their submission, authors decide to withdraw it, we ask them to notify the editor.

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### References

These may be submitted in either the Harvard or Vancouver systems. When following the *Harvard system* references should be indicated in the typescript by giving the author's name, with the year of publication in parentheses, e.g. Smith (1984); if there are three authors Smith, Green & Jones (1984) on the first citation

and Smith *et al.* (1984) subsequently; or if there are more than three authors Smith *et al.* (1984) throughout. If several papers from the same authors and from the same year are cited, (a), (b), (c), etc. should be put after the year of publication. References should be listed at the end of the paper in alphabetical order. Examples are:

- ABRAMS, D. B. & WILSON, G. T. (1979) Effects of alcohol on social anxiety in women: cognitive versus physiological processes, *Journal of Abnormal Psychology*, 88, 161–173.  
BLANE, H. T. & LEONARD, K. E. (1987) *Psychological Theories of Drinking and Alcoholism* (New York, Guilford Press).

When following the *Vancouver system* references should be numbered consecutively in the order in which they are first mentioned in the text. Identify references in text, tables, and legends by arabic numerals (in parentheses). References cited *only* in tables or in legends to figures should be numbered in accordance with a sequence established by the first mention in the text of the particular table or illustration.

The references should be listed in numerical order at the end of the paper. Examples are:

1. COTTON, N. (1987) The familial incidence of alcoholism, *Journal of Studies on Alcohol*, 40, 89–116.
2. MERIKANGAS, K. R. (1989) Genetics of alcoholism: a review of human studies, in: WETTERBERG, I. (Ed.) *Genetics of Neuropsychiatric Diseases*, pp. 21–28 (London, Macmillan).

Whatever referencing system is adopted, titles of journals should not be abbreviated. Issues or part numbers are not required. **All authors should be included.** The reference list should not be needlessly profligate and should only include items that are retrievable through standard bibliographic sources. Where foreign language papers or books are cited, the title in English needs to be included in brackets after the foreign language version.

#### Illustrations

These should not be inserted in the text but each provided separately and numbered on the back with Figure numbers, title of paper and name of author. Illustrations should be prepared about twice their final size. All photographs, graphs and diagrams should be referred to as Figures and should be numbered consecutively in the text in Arabic numerals (e.g. Fig 3). The approximate position of each illustration should be indicated in the text. A list of captions for the figures should be submitted on a separate sheet and should make interpretation possible without reference to the text. Captions should include keys to symbols.

#### Tables

These should be typed on separate sheets and their approximate position in the text should be indicated. Units should appear in parentheses in the column heading but not in the body of the table. Words or numerals should be repeated on successive lines 'ditto' or 'do' should not be used. Tables should not be ruled.

#### Proofs

Proofs are supplied for checking and making essential corrections, not for general revision or alteration. Proofs should be corrected and returned to the publisher within 3 days of receipt.

#### Offprints

Fifty offprints of each paper are supplied free. Additional copies may be purchased and should be ordered when the proofs are returned. Offprints, together with a complete copy of the relevant journal issue, are sent about three weeks after publication.

#### Refereeing

Papers will normally be sent by the Regional Editor for review to an Assistant Editor who will solicit referees' reports and make a recommendation to the Regional Editor. The regional editor will make a decision on the paper and communicate this with the authors. The Regional Editor or the Assistant Editor may return a paper unrefereed if in their judgement it is not suitable for the journal because of serious methodological limitations, the topic addressed or problems with reporting.

#### Copyright

It is a condition of publication that authors vest copyright in their articles, including abstracts, in the Society for the Study of Addiction to Alcohol and Other Drugs. This enables us to ensure full copyright protection and to disseminate the article, and the journal, to the widest possible readership in print and electronic formats as appropriate. Authors may, of course, use the article elsewhere *after* publication without prior permission from Carfax, provided that acknowledgement is given to the Journal as the original source of publication, and that Carfax is notified so that our records show that its use is properly authorised. Authors are themselves responsible for obtaining permission to reproduce copyright material from other sources.

**Appendix C**

**Ethical approval letter from Southampton University**



**University  
of Southampton**

**Department of  
Psychology**

*University of Southampton  
Highfield  
Southampton  
SO17 1BJ  
United Kingdom*

*Telephone +44 (0)23 8059 5000  
Fax +44 (0)23 8059 4597  
Email*

FAO Bethany O'Connell  
Clinical Psychology Department  
University of Southampton  
Highfield, Southampton

15<sup>th</sup> November 1999

Dear Bethany,

I am writing to confirm you that your ethical application titled, "Attentional bias and cognitive avoidance in problem and non-problematic drinkers" has been given approval by the department.

Should you require any further information, please do not hesitate in contacting me on (01703) 593995.

Yours sincerely,

Kathryn Smith  
Academic Secretary  
Psychology Department

**Appendix D**

**Ethical approval letter from East Dorset**

**Local Research Ethics Committee**



POOLE  
HOSPITAL  
NHS TRUST

Our Ref GPC.RCH/LREC. 71/99/S

3 August 1999

Miss Bethany O'Connell,  
Trainee Clinical Psychologist  
Building 44, Sheackleton  
University of Southampton  
Highfield  
Southampton SO17 1BJ

Dear Miss O'Connell

*Attentional bias and cognitive avoidance in problem and non-problematic drinkers*

The East Dorset Local Research Ethics Committee met on 29 July 1999 to discuss the above submission.

After discussion, ethical approval was granted.

*Conditions of approval are set out in the attached sheet and must be strictly adhered to. Protocol amendments should be submitted with a one page synopsis for the Committee's ease of reading, as should any Serious Adverse Events.*

Present at the meeting :

Dr G P Clein [Chairman]	Dr T Howard	Dr G Roberts	
B J Waltho	C Maunders	D Tory	M Burrows
Dr S Kidman	Dr A Yonace	Mr M Leggett	

Please quote the above LREC Number in all correspondence.

Yours sincerely

RACHAEL HANSON  
ADMINISTRATOR, EAST DORSET LOCAL RESEARCH ETHICS COMMITTEE





**Appendix E**

**Participant information sheet**

## SEDMAN UNIT

16-18 Tower Road, Boscombe, Bournemouth, BH1 4LB  
Telephone: (01202) 443174 Fax: (01202) 395116



Awarded for excellence



INVESTOR IN PEOPLE

### TAKING PART IN RESEARCH

#### Research Study: Information processing of people with alcohol abuse/dependence

#### Participant/Patient Information Sheet

You are being invited to take part in a research study. Before you decide it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with friends, relatives, your keyworker or any other staff if you wish. Please ask me if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.

Consumers for Ethics Research (CERES) publish a leaflet entitled 'Medical Research and You'. This leaflet gives more information about medical research and looks at some questions you may want to ask. A copy may be obtained from CERES, PO Box 1365, London, N16 0BW.

#### **Do I have to take part?**

It is up to you to decide whether or not to take part. If you do decide to take part you will be given this information sheet to keep and be asked to sign a consent form. If you decide to take part you are still free to withdraw at any time and without giving a reason. If you are a day-hospital patient withdrawing from the study will not affect the treatment you receive, whatsoever.

#### **What is the study about?**

The study is basic research into the nature of alcoholism. The causes of alcohol problems are still largely unknown. This study investigates whether the way people process information is important in leading them to drink in a harmful way. It is thought that people with these problems may be more sensitive to specific



types of information. The study will compare two groups: problem and non-problematic drinkers. The study will not provide any immediate benefit to you but the better we understand the causes of this disorder, the better treatment packages will become in the future.

### **What will I have to do?**

If you do decide to participate, you will be asked to take part in two short tasks.

#### Task 1.

You will be shown cards with various words printed on them in different colours. The task is to name the colours as quickly as possible, whilst ignoring the word itself.

#### Task 2.

You will be shown anagrams on cards. You will be asked to solve the anagrams as quickly as possible.

Finally, you will also be asked some questions about your drinking behaviour. The total participation time will be around half an hour.

### **Will my taking part in this study be kept confidential?**

Several precautions have been made to ensure confidentiality. I will not inform anyone about your participation in the study.

In the final part of the testing session I will ask you for information regarding your drinking behaviour. For those participants who are day-hospital patients, it may be necessary to review your medical notes in order to clarify certain details such as current diagnoses or exact medication. I will only consult medical notes on these specific aspects if you have given me permission to do so.

All information which is collected about you during the course of the research will be kept strictly confidential. You will be given a number and all your details will be stored under this number rather than your name. The only people who will know your number will be yourself and me, the investigator.

### **What will happen to the results?**

The research is being carried out as part of the requirements of my postgraduate course in Clinical Psychology at the University of

Southampton. The results of the study may be published, if this does happen participants will not be able to be identified. If you would like feedback on either your individual performance or the overall findings of the study, I can arrange this for you.

The Department of Psychology, University of Southampton and the East Dorset Local Research Ethics Committee have reviewed the research study.

Thank you for your time in reading this information sheet. If you have any questions or would like further information, please do not hesitate to ask. You can contact my supervisor or myself:

**Bethany O'Connell. Trainee Clinical Psychologist, Investigator.**

**Gerald Bennett. Consultant Clinical Psychologist, Supervisor.**

**Community Alcohol/Drug Team, Park Lodge, Gloucester Road,  
Boscombe Telephone (01202) 397003.**

**5<sup>th</sup> July 1999, Version 2**

**Appendix F**

**Participant consent form**



## **Appendix G**

### **Feedback letter to participants**

## SEDMAN UNIT

16-18 Tower Road, Boscombe, Bournemouth, BH1 4LB  
Telephone: (01202) 443174 Fax: (01202) 395116



Awarded for excellence



INVESTOR IN PEOPLE

### Feedback information

Research Study: Information processing of people with alcohol abuse/dependence

**Dear Participant,**

I am writing with a summary of the research study in which you very kindly took part. The aim of the study was to find out if there were differences in how problem drinkers and non-problem drinkers react to or process certain information.

#### **The background to the study**

The study looked at two ideas in the alcohol literature:

Firstly, there is an idea that alcohol-related information would catch the attention of individuals who have had drinking problems (but were now abstinent) more than other people who do not have drinking problems. It is also thought that in order to remain abstinent and to prevent drinking urges, these individuals would try to avoid thinking in detail about this type of information (more than non-problem drinkers).

Secondly, there is an idea that people often drink to cope with problems and stress. However, it is not known how problem drinkers react to threatening or stressful information and if this is any different from how non-problem drinkers do. Therefore, I wanted to see if threat information would catch the attention of people who had drinking problems more than others. I also wanted to see if they would try to avoid thinking about it in detail more than others.

#### **The method**

I studied two groups of people, one group who had had drinking problems (but were now abstinent), and another group of people who did not have drinking problems. The types of information I looked at included alcohol-related words such as 'pint', 'pub' and 'spirits' and threatening words such as 'bad' and 'failure'. I gave each group of people the same two tasks.

In one task I asked participants to read the colour of words printed in four different coloured inks. There were different cards relating to different types of word. Here, I wanted to find out if alcohol or threat information caught problem drinkers' attention





more than non-problem drinkers. It is thought that it would take people longer to do the task if they are distracted by the content of the words.

In the anagram task, I gave participants alcohol-related anagrams and threat-related anagrams to solve. Here, I wanted to find out if problem drinkers could keep and sustain their attention on alcohol-related and threat-related information as much as non-problem drinkers or if they would try and avoid it. It is thought that it would take longer for people to solve an anagram if the word represented something that they wanted to try and avoid thinking about in depth.

### **The findings**

In the colour-naming task it appeared that people who have had drinking problems were more distracted by alcohol words than other people who did not. This sort of processing is thought to play a part in drinking problems as it may mean that individuals are more aware of alcohol-related information and will focus upon it. This may be a factor in maintaining drinking problems. It may also mean it is more difficult to remain abstinent as very noticeable alcohol information may prompt drinking again.

It was not found that abstinent problem drinkers avoided alcohol information any more than non-problem drinkers.

Finally, it appears that people who have had alcohol problems do not respond to threatening information any differently than those without alcohol problems. Therefore, the processing of this information as a rule, does not appear an important part of problem drinking.

### **The implications**

The main finding, revealing how attention-grabbing alcohol information can be for problem drinkers, supports other similar studies. If problem drinkers do have an increased sensitivity to alcohol-related information, treatment could help them reduce this sensitivity. Coping strategies could help someone avoid drinking alcohol if prompted by alcohol information.

This study's findings are tentative and as always more research is needed. However, it does add a contribution to this important research area. Please feel free to contact me at the above address if you have any comments or queries.

**Thank you very much for your time in participating with this study.**

Yours sincerely,

Bethany R. O'Connell.

**Appendix H**

**DSM-IV Diagnostic interview  
(for the clinical and control group)**

**RESEARCH STUDY: Information processing of people with alcohol abuse/dependence**

**DRINKING BEHAVIOUR INTERVIEW**

**Participant number** \_\_\_\_\_ **Date** \_\_\_\_\_

**Age** \_\_\_\_\_ **Gender** \_\_\_\_\_

I am going to ask you some questions about your drinking. Please answer these questions honestly. Remember, no one but yourself and I will know your answers, and all the information will be kept under a number and not a name.

*For all questions, ask recently (within the last year)?, ever?, when? And did it affect drinking behaviour afterwards?*

**Alcohol abuse**

1. Has your performance at work (or university) ever been affected by your drinking? (e.g., either due to the after-effects – hangover – or due to actual intoxication).

**Yes / No**

If **yes**, could you briefly describe how.

2. Have you ever taken any time off work (or university) due to your drinking? (e.g., either due to the after-effects – hangover – or due to actual intoxication).

**Yes / No**

If **yes**, could you indicate how much time.

3. Have you ever neglected household/child-care responsibilities because of drinking?

**Yes / No**

If **yes**, could you briefly describe how.

4. Have you ever operated machinery, including driving, whilst drunk?  
Have you put yourself in potentially dangerous or hazardous situations whilst drinking?

**Yes / No**

If **yes**, could you please give an example.

5. Have you ever been in trouble with the police because of alcohol?

**Yes / No**

If **yes**, could you briefly describe how.

6. Have you experienced problems in relationships (professional/social/personal) caused by drinking? (e.g., argument with a partner).

**Yes / No**

If **yes**, could you briefly describe the problems.

### Alcohol Dependence

7. Have you ever felt that your tolerance to alcohol has increased so that a drink does not affect you as it would others?

**Yes/ No**

Do you need to drink more alcohol to get drunk?

**Yes / No**

8. What happens if you do not drink for over twelve hours?

Have you ever drunk alcohol to avoid these effects?

**N/A Yes/ No**

9. In a drinking session, have you ever drunk more and for longer than you intended?  
Yes/ No

10. Have you ever made efforts to cut down or control your drinking?  
Yes/No  
Have you been successful?  
Yes/ No

11. Do you plan your life around drinking (and spend a large part of the day obtaining, consuming and recovering from alcohol)?  
Yes / No

12. Have you spent less time on or given up other activities because of drinking alcohol? (occupation, social, leisure)  
Yes / No

13. Has your drinking ever caused or made worse any physical or psychological problems you've had?  
Yes/No  
And have you continued to drink despite knowing this?  
Yes / No

### **Additional questions**

14. Are you currently drinking?  
Yes / No

If **yes**, on how many days have you been drinking in the past month?  
\_\_\_\_\_

If **no**, could you indicate how long (months, weeks and days) you have been abstinent.  
\_\_\_\_\_

15. Are you currently receiving professional help for your drinking?  
Yes / No

16. Have you in the past received professional help for your drinking?  
Yes / No

17. On a typical drinking day how much would you/do you drink? (or typical amount of drinks per week). \_\_\_\_\_

18. Have you ever suffered a head injury e.g. an accident leading to concussion, or a surgical operation on your brain?

**Yes / No**

If **yes**, please can you describe what happened?

19. Are you currently suffering from depression, anxiety, another mood or psychological disorder?

**Yes / No**

If **yes**, please can you give details.

20. Are you currently taking any medication e.g. for your mood?

**Yes / No**

If **yes**, please can you give details.

21. Are you currently taking any other psychotropic substance, e.g., hard or soft drug, methadone ...?

**Yes / No**

If **yes**, please can you give details.

22. Check:

18 years or over?

English as a first language?

Colour blind? (test)

Reported visual acuity impairment (not rectifiable by glasses)?

Reported dyslexia?

- How did you get on at school?
- Did you have any difficulties with anything?
- Do you have trouble with reading/writing/spelling?
- Did your parents have similar problems?
- Do you read newspapers/books?

Occupation?

Thank you for your time and co-operation.

**Appendix I**

**Mill Hill Vocabulary Scale (MHV)**

**and instructions for scoring**

# Set A

In each group below, carefully fill in the circle like this ● next to the word that is **closest** in meaning to the word in heavy type above the group. Make sure you fill in one circle only. If you make a mistake, put a cross through the incorrect answer like this ✗ and fill in the correct one. If you don't know the answer, have a guess or move on to the next question. The first one has been done for you as an example. Work downwards through each column.

## 1 Rage

- crease                      ○ love  
○ invite                      ● anger  
○ rain                         ○ hoist

## 2 Squabble

- saw                         ○ lift  
○ bubble                    ○ photo  
○ mould                    ○ quarrel

## 3 Connect

- join                        ○ field  
○ lace                       ○ bean  
○ flint                       ○ accident

## 4 Provide

- harmonise                ○ divide  
○ hurt                        ○ commit  
○ annoy                     ○ supply

## 5 Brag

- choose                    ○ boast  
○ hope                      ○ stone  
○ lag                         ○ jerk

## 6 Shriveled

- linger                     ○ heed  
○ volunteer                ○ wither  
○ shiver                    ○ haunt

## 7 Mingle

- interfere                 ○ press  
○ mix                        ○ declare  
○ gamble                    ○ remark

## 8 Stance

- partition                ○ fixed  
○ glance                    ○ slope  
○ position                 ○ grief

## 9 Verify

- dedicate                 ○ confirm  
○ chastise                 ○ change  
○ correct                   ○ purify

## 10 Formidable

- unexpired                ○ ravishing  
○ feasible                   ○ orderly  
○ tremendous             ○ remembrance

## 11 Thrive

- think                     ○ try  
○ thrash                    ○ reap  
○ blame                    ○ flourish

## 12 Docile

- meek                     ○ passionate  
○ dominant                ○ homely  
○ careless                 ○ dumb

## 13 Virile

- demanding              ○ familiar  
○ concise                 ○ manly  
○ vulgar                    ○ barbarous

## 14 Surmount

- mountain                ○ overcome  
○ concede                 ○ descend  
○ appease                 ○ snub

## 15 Sultry

- instinctive              ○ solid  
○ sulky                     ○ severe  
○ trivial                    ○ muggy

## 16 Criterion

- superior                 ○ critic  
○ certitude               ○ standard  
○ clarion                   ○ crisis

## 17 Latent

- delayed                 ○ discharged  
○ potential                ○ overburdened  
○ ingenious               ○ hostile

## 18 Dwindle

- swindle                 ○ pander  
○ linger                    ○ wheeze  
○ diminish                ○ compare

## 19 Construe

- prophesy                ○ interpret  
○ contradict               ○ collect  
○ scatter                   ○ anneal

## 20 Efface

- delete                    ○ rotate  
○ disgust                   ○ mark  
○ adjoin                   ○ ascend

## 21 Trumpery

- etiquette                ○ heraldry  
○ worthless               ○ highest  
○ amusement             ○ final

## 22 Perpetrate

- appropriate             ○ control  
○ propitiate               ○ deface  
○ commit                   ○ pierce

## 23 Glower

- scowl                    ○ shine  
○ disguise                ○ gloat  
○ aerate                   ○ extinguish

## 24 Sensual

- controversial           ○ careful  
○ necessary               ○ crucial  
○ rational                 ○ carnal

## 25 Obdurate

- formidable              ○ permanent  
○ hesitant                ○ stubborn  
○ exorbitant              ○ obsolete

## 26 Palliate

- regenerate             ○ qualify  
○ alleviate                ○ imitate  
○ stimulate               ○ erase

## 27 Adulate

- increase                ○ waver  
○ admire                   ○ prosper  
○ flatter                   ○ inflate

## 28 Felicitous

- sincere                   ○ faithful  
○ valedictory            ○ altruistic  
○ voracious               ○ opportune

## 29 Ambit

- talisman                ○ confines  
○ armature                ○ arc  
○ camber                   ○ ideal

## 30 Recondite

- brilliant                 ○ effervescent  
○ vindictive              ○ abstruse  
○ indifferent              ○ wise

## 31 Cachinnation

- guffaw                   ○ succour  
○ conclave                ○ conjunction  
○ cunning                   ○ controversy

## 32 Exiguous

- exhausting              ○ prodigious  
○ indigenous              ○ esoteric  
○ scanty                    ○ expedient

## 33 Putative

- punishable              ○ computable  
○ supposed                ○ worthless  
○ aggressive               ○ reconcilable

## 34 Manumit

- manufacture            ○ liberate  
○ enumerate               ○ emanate  
○ accomplish              ○ permit

GO STRAIGHT ON TO SET B



# Set B

The first one has been done for you.  
Work downwards through each column.

## 1 Malaria

- basement       fever  
 theatre       fruit  
 ocean       tune

## 2 Fascinated

- ill-treated       modelled  
 poisoned       charmed  
 frightened       copied

## 3 Liberty

- freedom       worry  
 rich       serviette  
 forest       cheerful

## 4 Stubborn

- steady       hopeful  
 obstinate       hollow  
 orderly       slack

## 5 Precise

- natural       exact  
 faulty       grand  
 stupid       small

## 6 Resemblance

- memory       fondness  
 assemble       repose  
 attendance       likeness

## 7 Anonymous

- applicable       magnificent  
 insulting       fictitious  
 nameless       untrue

## 8 Elevate

- raise       move  
 revolve       work  
 waver       disperse

## 9 Task

- horn       game  
 trap       jail  
 problem       job

## 10 Courteous

- dreadful       proud  
 polite       short  
 curtsey       truthful

## 11 Prosper

- imagine       propose  
 succeed       beseech  
 punish       trespass

## 12 Lavish

- unaccountable       selfish  
 romantic       lawful  
 extravagant       praise

## 13 Immerse

- frequent       hug  
 reverse       dip  
 rise       show

## 14 Conciliate

- congregate       reverse  
 pacify       radiate  
 compress       strengthen

## 15 Envisage

- enfeeble       contemplate  
 surround       estrange  
 activate       regress

## 16 Amulet

- cameo       jacket  
 flirtation       crest  
 charm       savoury

## 17 Garrulous

- talkative       daring  
 massive       ugly  
 ridiculous       fast

## 18 Libertine

- profligate       rescuer  
 farrago       canard  
 regicide       missionary

## 19 Bombastic

- democratic       anxious  
 bickering       cautious  
 destructive       pompous

## 20 Levity

- parsimony       frivolity  
 salutary       velleity  
 alacrity       tariff

## 21 Whim

- complain       noise  
 tonic       fancy  
 wind       rush

## 22 Ruse

- limb       paste  
 trick       burn  
 colour       rude

## 23 Recumbent

- fugitive       cumbersome  
 unwieldy       repelling  
 penitent       reclining

## 24 Querulous

- astringent       fearful  
 petulant       curious  
 inquiring       spurious

## 25 Temerity

- impermanence       rashness  
 nervousness       stability  
 punctuality       submissiveness

## 26 Fecund

- esculent       optative  
 profound       prolific  
 sublime       salic

## 27 Abnegate

- contradict       decry  
 renounce       execute  
 belie       assemble

## 28 Traduce

- challenge       attenuate  
 suspend       establish  
 misrepresent       conclude

## 29 Vagary

- vagabond       caprice  
 obscurity       vulgarity  
 evasion       fallacy

## 30 Specious

- fallacious       coeval  
 palatial       typical  
 nutritious       flexible

## 31 Sedulous

- rebellious       dilatory  
 complaisant       diligent  
 seductive       credulous

## 32 Nugatory

- inimitable       adamant  
 sublime       contrary  
 numismatic       trifling

## 33 Adumbrate

- foreshadow       protect  
 detect       eradicate  
 elaborate       approach

## 34 Minatory

- implacable       diminutive  
 belittling       quiescent  
 depository       threatening

Scoring of the MHV Scale (Raven, Raven & Court, 1998)

Form used – All Multiple Choice Version – Senior Forms (Raven, Raven & Court, 1997)

In order to score the senior forms each correct answer is scored as one point. A score of 10 is added to each of the two sets of questions (A and B) to gain a score out of 88. The total score can then be compared with normative groups (see Raven et al., 1998).

Raven, J., Raven, J.C. & Court, J.H. (1997). Mill Hill Vocabulary Scale. Oxford, Oxford Psychologists Press.

Raven, J., Raven, J.C. & Court, J.H. (1998). Mill Hill Vocabulary Scale (1998 Edition), Raven Manual: Section 5. Oxford, Oxford Psychologists Press.

**Appendix J**

**Alcohol Use Disorders Identification Test  
(AUDIT) and instructions for scoring**

**RESEARCH STUDY:**  
**Information processing in people with alcohol abuse/ dependence**

**AUDIT**

**Date** \_\_\_\_\_

**Participant number** \_\_\_\_\_

**Age** \_\_\_\_\_

**Gender** \_\_\_\_\_

**Please circle the answer that is correct for you**

1. How often do you have a drink containing alcohol?

Never	Monthly or less	Two to four times a month	Two to three times a week	Four or more times a week
-------	--------------------	------------------------------	------------------------------	------------------------------

2. How many drinks containing alcohol do you have on a typical day when you are drinking?

1 or 2	3 or 4	5 or 6	7 to 9	10 or more
--------	--------	--------	--------	------------

3. How often do you have 6 or more drinks on one occasion?

Never	Less than monthly	Monthly	Weekly	Daily or almost daily
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4. How often during the last year have you found you were not able to stop drinking once you had started?

Never	Less than monthly	Monthly	Weekly	Daily or almost daily
-------	----------------------	---------	--------	--------------------------

5. How often during the last year have you failed to do what was normally expected from you because of drinking?

Never	Less than monthly	Monthly	Weekly	Daily or almost daily
-------	----------------------	---------	--------	--------------------------

6. How often during the last year have you needed a first drink in the morning to get yourself going after a heavy drinking session?

Never	Less than monthly	Monthly	Weekly	Daily or almost daily
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7. How often during the last year have you had a feeling of guilt or remorse after drinking?

Never	Less than monthly	Monthly	Weekly	Daily or almost daily
-------	-------------------	---------	--------	-----------------------

8. How often during the last year have you been unable to remember what happened the night before because you had been drinking?

Never	Less than monthly	Monthly	Weekly	Daily or almost daily
-------	-------------------	---------	--------	-----------------------

9. Have you or someone else been injured as a result of your drinking?

No	Yes, but not in the last year	Yes, during the last year
----	-------------------------------	---------------------------

10. Has a relative or friend or a doctor or other health worker, been concerned about your drinking or suggested you cut down?

No	Yes, but not in the last year	Yes, during the last year
----	-------------------------------	---------------------------

Instructions for Scoring Alcohol Use Disorders Identification Test (AUDIT, Saunders, Aasland, Babor, de la Fuente & Grant, 1993)

Questions 1-8 are scored 0, 1, 2, 3, 4. Questions 9 and 10 are scored 0, 2, 4 only. The response coding is as follows:

Score	0	1	2	3	4
Question 1	Never	Monthly or less	Two to four times per month	Two to three times per week	Four or more times per week
Question 2	1 or 2	3 or 4	5 or 6	7 to 9	10 or more
Questions 3-8	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
Questions 9-10	No		Yes, but not in the last year		Yes, during last year

The minimum score (for non-drinkers) is 0 and the maximum possible score is 40. A score of 8 or more indicates a strong likelihood of hazardous or harmful alcohol consumption.

Saunders, J.B., Aasland, O.G., Babor, T.F., De La Fuente, J.R. & Grant, M. (1993). Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO collaborative project on early detection of persons with harmful alcohol consumption - II, *Addiction*, 88, 791-804.

**Appendix K**

**Severity of Alcohol Dependence Questionnaire – Form C  
(SADQ-C) and instructions for scoring**

**RESEARCH STUDY: Information processing of people with alcohol abuse/dependence**

**SADQ-C**

**Participant number** \_\_\_\_\_

**Date** \_\_\_\_\_

**Age** \_\_\_\_\_

**Gender** \_\_\_\_\_

HAVE YOU DRUNK ALCOHOL IN THE PAST SIX MONTHS? YES/NO

If YES, please answer all of the following questions about your drinking by circling your most appropriate response.

**DURING THE PAST THREE MONTHS**

1. The day after drinking alcohol, I woke up feeling sweaty.

NEVER or                      SOMETIMES                      OFTEN                      NEARLY ALWAYS  
ALMOST  
NEVER

2. The day after drinking alcohol, my hands shook first thing in the morning.

NEVER or                      SOMETIMES                      OFTEN                      NEARLY ALWAYS  
ALMOST  
NEVER

3. The day after drinking alcohol, my whole body shook violently first thing in the morning if I didn't have a drink.

NEVER or                      SOMETIMES                      OFTEN                      NEARLY ALWAYS  
ALMOST  
NEVER

4. The day after drinking alcohol, I woke up absolutely drenched in sweat.

NEVER or                      SOMETIMES                      OFTEN                      NEARLY ALWAYS  
ALMOST  
NEVER



5. The day after drinking alcohol, I dreaded waking up in the morning.

NEVER or  
ALMOST  
NEVER

SOMETIMES

OFTEN

NEARLY ALWAYS

6. The day after drinking alcohol, I was frightened of meeting people first thing in the morning.

NEVER or  
ALMOST  
NEVER

SOMETIMES

OFTEN

NEARLY ALWAYS

7. The day after drinking alcohol, I felt at the edge of despair when I awoke.

NEVER or  
ALMOST  
NEVER

SOMETIMES

OFTEN

NEARLY ALWAYS

8. The day after drinking alcohol, I felt very frightened when I awoke.

NEVER or  
ALMOST  
NEVER

SOMETIMES

OFTEN

NEARLY ALWAYS

9. The day after drinking alcohol, I liked to have an alcoholic drink in the morning.

NEVER or  
ALMOST  
NEVER

SOMETIMES

OFTEN

NEARLY ALWAYS

10. The day after drinking alcohol, in the morning I always gulped my first few drinks down as quickly as possible.

NEVER or  
ALMOST  
NEVER

SOMETIMES

OFTEN

NEARLY ALWAYS

11. The day after drinking alcohol, I drank more alcohol in the morning to get rid of the shakes.

NEVER or  
ALMOST  
NEVER

SOMETIMES

OFTEN

NEARLY ALWAYS

12. The day after drinking alcohol, I had a very strong craving for an alcoholic drink when I awoke.

NEVER or  
ALMOST  
NEVER

SOMETIMES

OFTEN

NEARLY ALWAYS

13. I drank more than a quarter of a bottle of spirits in a day (OR 4 doubles OR 1 bottle of wine OR 4 pints of beer).

NEVER or  
ALMOST  
NEVER

SOMETIMES

OFTEN

NEARLY ALWAYS

14. I drank more than half a bottle of spirits in a day (OR 2 bottles of wine OR 8 pints of beer).

NEVER or  
ALMOST  
NEVER

SOMETIMES

OFTEN

NEARLY ALWAYS

15. I drank more than one bottle of spirits in a day (OR 4 bottles of wine OR 15 pints of beer).

NEVER or  
ALMOST  
NEVER

SOMETIMES

OFTEN

NEARLY ALWAYS

16. I drank more than two bottles of spirits in a day (OR 8 bottles of wine OR 30 pints of beer).

NEVER or  
ALMOST  
NEVER

SOMETIMES

OFTEN

NEARLY ALWAYS

IMAGINE THE FOLLOWING SITUATION

1. You have HARDLY DRUNK ANY ALCOHOL FOR A FEW WEEKS.
2. You then drink VERY HEAVILY for TWO DAYS.

How would you feel the morning after those two days of heavy drinking?

17. I would start to sweat

NOT AT ALL      SLIGHTLY      MODERATELY      QUITE A LOT

18. My hands would shake

NOT AT ALL      SLIGHTLY      MODERATELY      QUITE A LOT

19. My body would shake

NOT AT ALL      SLIGHTLY      MODERATELY      QUITE A LOT

20. I would be craving for a drink

NOT AT ALL      SLIGHTLY      MODERATELY      QUITE A LOT

Thank you for your help and co-operation.

Instructions for scoring Severity of Alcohol Dependence Questionnaire – Form C (SADQ-C, Stockwell & Sitharthan, 1991; Stockwell, Sitharthan, McGrath & Lang, 1994).

Questions 1-16 are scored 0,1, 2 or 3, questions 17-20 are scored 0, 1, 2 or 3.

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Score	0	1	2	3
Questions 1-16	Never or Almost never	Sometimes	Often	Nearly always
Questions 17-20	Not at all	Slightly	Moderately	Quite a lot

---

A higher score (range = 0 – 60) indicates a higher level of alcohol dependence. For non-clinical samples only the first 16 items are administered (omitting items relating to reinstatement), and the total remaining score is pro-rated (multiplying by 1.25). Scores of 31 and above can be regarded as indicating severe alcohol dependence.

Stockwell, T., Sitharthan, T., McGrath, D. & Lang, E. (1994). The measurement of alcohol dependence and impaired control in community samples, Addiction, 89, 167-174.

Stockwell, T. & Sitharthan, T. (1991). The Measurement of Alcohol Dependence in Community and Clinic samples: Guidelines for Administration of the Impaired Control Questionnaire (ICQ) and Severity of Alcohol Dependence Questionnaire Form-C (SADQ-C). Perth, Australia National Centre for Research into the Prevention of Drug Abuse. (Available from T. Stockwell).

## Appendix L

### Standardised instructions for the Stroop task

## **Standardised instructions for the administration of the Stroop task**

When the participants were sat down at a table the following standardised instructions were read to them by the investigator.

“For this task I shall show you four separate sheets of card. Each card has different words printed on it in various colours. The task is to name aloud the colour that each word is printed in whilst ignoring the content of the word. Try and name the colours as quickly as possible without making any mistakes. If you make an error, please do not stop.

“I would like you to start at the top left and go vertically down the column of words before moving to the top of the next column until you reach the end ... *[Shows the participant on a blank piece of card]* ... I shall be measuring the time it takes you to complete a card. I shall start the timer when I turn over the card and you may start to name the colour of the words. I shall stop the timer when you have said the colour of the last word ... Are there any questions?

“Before beginning the actual task I have a practice sheet for you to try. Here are different length strings of the letter ‘O’. Please just read the colour of each letter string as fast as possible ... Start here and continue here.”

“Any questions?”

## Appendix M

### Standardised instructions for the anagram task

## **Standardised instructions for the administration of the anagram task**

When the participants were sat down at a table the following standardised instructions were read to them by the investigator.

“For this task I shall show you anagrams. These are words where the letters have been jumbled up. I would like you to try and solve each anagram as quickly as you can, and to name aloud the word when you get it. There are 18 words altogether written separately on pieces of card. Each word can be solved. If you guess the anagram solution wrongly I shall say “No”. If, after one minute you have not solved the anagram I shall stop you, tell you the correct answer, and move on to the next word.

“I shall start the timer when I turn over the card and stop the timer when you have said the word. I have provided a pen and scrap paper if this helps but you do not have to use them. Do you have any questions?”

“Before beginning the actual task I have some practice words. Please try and unscramble the letters as fast as you can and tell me the word. Any questions?”



## **Cognitive processing biases in alcohol use, abuse and dependence**

### **Critical overview**

This study explored a neglected area of information processing research, that of attentional biases and cognitive avoidance to threat-related and disorder-related information in alcohol use and dependence. A strength of the study was that the groups were similar for potentially confounding variables such as age, gender and IQ. The study also controlled for possible alcohol withdrawal symptoms that may have impaired problem drinkers' cognitive functioning by waiting for at least one month to elapse after abstinence began before testing participants (Knight & Longmore, 1994).

The study does have some methodological limitations that could be avoided if it were to be attempted again. Other unmeasured variables might have influenced the results such as state/trait anxiety and depression. During the course of the project formalised diagnostic assessments were found that would have made the semi-structured diagnostic interview even more reliable, such as the Structured Clinical Interview for DSM, Patient Edition (SCID-P, Spitzer, Williams, Gibbon & First, 1990). Furthermore, other measures used to describe problem severity could have been employed to complement the SADQ-C such as an alcohol-related problems inventory or a formalised alcohol consumption measure (e.g., timeline followback procedure; Sobell & Sobell, 1992). Larger samples would have been desirable particularly for the statistical analyses although the sample was large enough to find

one predicted significant effect. In particular, increased numbers of males and females would have allowed an investigation of gender in relation to biases.

The length of abstinence (four weeks to six months) in the clinical group may have led to weaker disorder- or threat-related processing, and hence to non-significant findings. However statistical analyses found that the length of abstinence was not related to the extent of bias, therefore, the varying duration of abstinence among the clinical group may not have influenced the results unduly. A future improvement might be to test individuals within a tighter time frame after abstinence.

A more thorough investigation of the threat processing hypothesis could have included using different types of threat as well as self-esteem threats (e.g., McManus Waller & Chadwick, 1996). In addition, more varied measures to pick up possible correlates of self-esteem threat processing biases within the two groups would have been informative. It may be that drinking to escape threat may be dimensionally linked with factors such as the 'drinking to cope' motive or an avoidant coping style (e.g., Cooper, Russell & George, 1988).

Limitations of the Stroop paradigms may have affected results. The paradigm was chosen due to a large research base, and because it was specifically applied in alcohol studies and in a threat-processing study in bulimia (McManus et al., 1996). The design of the alcohol condition of the Stroop task was taken from other alcohol studies (e.g., Johnsen, Laberg, Cox, Vaksdal & Hugdahl, 1994), however, without additional controls only cautious interpretation can be made of the significant disorder-related processing bias. A future study could employ additional control

groups and/or word categories to control for historical emotional associations with the stimuli, 'expertise' knowledge effects and associability of key categories.

Similarly different control conditions were considered in designing the Stroop's self-esteem threat condition. Emotional disorder studies suggest that task interference depends on the emotional stimuli's relatedness to current concern, rather than on its emotionality per se (e.g., Mathews & Klug, 1993). Another emotional word category was, therefore, thought unnecessary since the self-esteem threat words were identified a priori as concern-relevant to problem drinkers. Williams, Mathews & MacLeod (1996) suggested that individuals with emotional disturbance may have a disproportionate attentional bias to negative stimuli as well as a bias toward their current concern. Therefore, it could be argued that if the clinical group had shown a processing bias towards self-esteem threats this might be just towards negative stimuli in general. The use of the dimensional measure of alcohol severity was employed to counter this limitation. If the severity of dependency had correlated with the amount of interference with colour-naming then this would have supported the hypothesis that self-esteem threats were key to problem drinking.

The use of the card format in the Stroop task could also throw doubt on the significant findings. This format is said to be affected by inter-item priming which may lead to more robust results than its counterpart, the computer presentation (e.g., Dalgleish, 1995). However Williams et al. (1996) suggest that priming effects are insufficient to explain the effects in card-based studies, and the format does not have an impact on the relevance of underlying mechanisms. In alcohol studies similar

effects have been found in both card and computer presentations (e.g., Johnsen et al., 1994; Stetter, Ackermann, Bizer, Straube & Mann, 1995).

A future study could also employ another attentional bias paradigm, given the other possible explanations for performance on this task. However other measures (e.g., the visual dot-probe task) have not been subjected to as much systematic research as the Stroop task (Wells & Matthews, 1994; Williams, Watts, MacLeod & Mathews, 1997).

The anagram task was employed in the cognitive avoidance task because it had previously been used to look at self-esteem threat processing (Meyer, Serpell, Waller, Murphy, Treasure & Leung, under consideration; Waller & Meyer, 1997) and because it fitted a theoretical model of threat processing (Beck & Clark, 1997). It is a relatively novel task and similar to other cognitive avoidance paradigms, does not have a background of systematic research (compared to the Stroop task). The present findings were possibly due to artifactual explanations. These include possible unequal difficulty of anagrams (alcohol words being easier than others) or that, the alcohol category may have been initially more recognisable (thus priming participants to look for this category of word). Improvements to tighten the design might include using a larger pilot study to equate anagram solution times, equating words for frequency in language, and increasing the number of distracter word categories. In view of these limitations, it is suggested that the task requires more systematic study and comparison with other measures of cognitive avoidance such as a homograph decision design (Amir, Foa & Coles, 1998) or a visual dot-probe task (Mogg, Bradley, de Bono & Painter, 1997). Further, these latter paradigms have

been used to study both initial attentional bias and subsequent cognitive avoidance phenomena, and therefore, can investigate the stages of threat or disorder-related processing across one task.

In sum, the study as it stands was a sound attempt to explore a new area. The refinement of paradigms and the use of additional measures could have controlled and accounted for possible influencing variables and these adjustments would be useful in future studies. However, a practical constraint on these extra controls is that the duration of assessment might have increased beyond a time tolerable for many potential participants. Thus, studying one cognitive process (attentional bias or cognitive avoidance) relating to one theme of word (threat- or disorder-related words) might be more realistic in such work.

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