

# **Predictors of Relapse in Alcohol Dependence**

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**Doctorate in Clinical Psychology**

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**2008**

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## **Acknowledgements**

I would like to dedicate this work to the patients within the Alcohol Problems Service in Edinburgh. I would hope any benefits to the service that may happen following this project will be felt by these individuals.

Fraser Morrison.

## Declaration of own work

I confirm that all this work is my own except where indicated, and that I have:

- Composed and undertaken the work myself
- Clearly referenced/listed all sources as appropriate
- Referenced and put in inverted commas any quoted text of more than three words (from books, web, etc)
- Given the sources of all pictures, data etc. that are not my own
- Not made undue use of essay(s) of any other student(s) either past or present (or where used, this has been referenced appropriately)
- Not sought or used the help of any external professional agencies for the work (or where used, this has been referenced appropriately)
- Not submitted the work for any other degree or professional qualification except as specified
- Acknowledged in appropriate places any help that I have received from others (e.g. fellow students, technicians, statisticians, external sources)

I understand that any false claim for this work will be penalised in accordance with the University regulations

**Signature** *Kim Morrison* .....

**Date** *28/10/08* .....

## **Abstract**

**Background:** Relapse rates following treatment for alcohol dependence are high, and efforts to prevent relapse are an integral part of treatment. Outcome studies have reported relapse rates of 65 per cent within one year of treatment, with the majority relapsing within less than three months. Many factors have been studied as potential predictors of relapse in alcohol dependence, such as psychiatric disorder.

**Methods:** Fifty four residents in an inpatient alcohol detoxification unit were tested on measures of memory and executive functioning, mood, self efficacy, quality of life, and liver function at the end of a 7 to 10 day stay in the unit. These patients were then followed up 3 months later via a telephone interview to ascertain the number of days drinking alcohol during this period. The sample of the study contained individuals at the severe end of the range of alcohol dependence, a group that has been largely neglected throughout the literature.

**Results:** Low mood during detoxification was found to predict number of days drinking in the three months following discharge. Executive dysfunction was also associated with relapse to a lesser extent.

**Conclusions:** Low mood appears to be a significant barrier to ability to remain abstinent from alcohol following a period of detoxification. Interventions to reduce depression may have a beneficial effect in reducing relapse rates in individuals at the severe end of the range of alcohol dependence.

# 1. Introduction

## 1.1. Background

### 1.1.1 Alcohol consumption

Alcohol misuse is common in the United Kingdom with one in four men and one in seven women drinking more than the recommended limits (Dong & Erens, 1997). The Scottish Health Survey 1995 (Dong & Erens, 1997) estimated that the numbers of Scottish adults exceeding the weekly recommended limits of alcohol intake, 21 units for men and 14 units for women, were 27 per cent of men and 13 per cent of women. Within this survey, 8 per cent of men reported drinking above 50 units per week and one per cent of women drinking above 35 units per week, which are known to be harmful levels of alcohol consumption (Shaw *et al.*, 2000).

There is evidence that levels of alcohol misuse are increasing. Within the Scottish Health Survey 2003 (Bromley *et al.*, 2005) 23 per cent of men reported drinking in excess of the recommended limit of 21 units per week, and 14 per cent of women reported usual alcohol consumption in excess of the recommended limit of 14 units per week. That is, an increasing proportion of the Scottish population consume alcohol at a harmful level. In addition to this, a significant number indicated they regularly drank to excess during one day, commonly termed binge drinking. Among men, 66 per cent drank more than the recommended level of 8 units of alcohol during

one sitting, and in women over 50 per cent reported drinking more than the recommended 6 units (Bromley *et al.*, 2005).

### **1.1.2. Individual and societal effects of alcohol consumption**

It is clear from the aforementioned statistics that alcohol consumption within the United Kingdom and Scotland is increasing at an unprecedented level. At present these levels are greater than they have been in the past, which has created numerous problems for society. Binge drinking is estimated to cost the UK £20 billion annually, with hangovers resulting in 17 million lost working days and costing employers £6.4 billion per year (Cabinet Office Press Office, 2003). The cost of alcohol misuse to the National Health Service (NHS) in Scotland is estimated to be £95.6 million, and the total cost to Scottish society at an estimated £1.1 billion (Scottish Executive, 2005).

The individual problems caused by alcohol misuse initially stem from the effects of alcohol. Excessive alcohol consumption initially leads to intoxication and drunkenness. This can result in physical health problems directly, such as head injuries sustained after a fall during a period of intoxication or binge drinking. Excessive consumption of alcohol can also lead to a number of psychological and social problems for the individual during and following a bout of heavy drinking. Examples of this include absence from employment in the day following a bout of drinking, and engaging in arguments with family while intoxicated. Indeed, 63 per cent of 18 to 24 year-olds admit to committing criminal or disorderly behaviour after

drinking (Home Office, 2006).

### **1.1.3 Definition of alcohol misuse**

The term alcohol misuse broadly describes the nature of the damaging relationship an individual has with alcohol. Under this term there are three more specific descriptions of alcohol consumption which are categorised in terms of severity of misuse: binge drinking, harmful drinking, and alcohol dependence. A comprehensive description of these terms is displayed in Table 1.

The first of these categories, binge drinking describes patterns of alcohol misuse that are less severe and may be termed as being more socially acceptable (Bromley *et al.*, 2005). For example, it is not uncommon for an individual to consume alcohol in excess of the recommended daily intake in one sitting, as outlined in Table 1. Following on from this, the second category of alcohol misuse is accompanied by more serious consequences of misuse (World Health Organisation, 1992). For example, an individual may suffer secondary physical affects such as short-term liver damage following excessive consumption of alcohol.

The final category within alcohol misuse is alcohol dependence. This provides a description of the most serious form of alcohol misuse, where individuals may merit a pathological diagnosis (World Health Organisation, 1992). This latter area, namely alcohol dependence, is the focus within the current study.

Table 1: Classification of alcohol misuse

<b>Diagnosis</b>	<b>Description</b>
Binge drinking	There is no commonly accepted definition but the Scottish Health Survey uses the criterion of drinking more than twice the recommended daily benchmark on a person's heaviest drinking day (more than 8 units for men and more than 6 units for women) (Bromley <i>et al.</i> , 2005)
Harmful drinking	A pattern of drinking that causes damage to physical (e.g. to the liver) or mental health (e.g. episodes of depression secondary to heavy consumption of alcohol) (World Health Organisation, 1992)
Alcohol dependence	<p>A cluster of physiological, behavioural and cognitive phenomena. This requires the presence of three or more of the following criterion for a diagnosis of alcohol dependence:</p> <ul style="list-style-type: none"> <li>▪ a strong desire or sense of compulsion to take alcohol</li> <li>▪ impaired capacity to control alcohol taking behaviour</li> <li>▪ a physiological withdrawal state</li> <li>▪ evidence of tolerance to the effects of alcohol</li> <li>▪ preoccupation with alcohol use (to the detriment</li> </ul>

	<p>of alternative pleasures or interests)</p> <ul style="list-style-type: none"> <li>▪ persistent alcohol use despite clear evidence of harmful consequences (World Health Organisation, 1992).</li> </ul>
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#### **1.1.4. Relapse in alcohol dependence**

Alcohol dependence appears to be a relapsing condition (Marlatt, 1996). Between 30 and 50 per cent of individuals who present for alcohol treatment relapse within three months (Slattery *et al.*, 2003). That is, they have returned to drinking alcohol at a level that at least matches previous consumption. Within the alcohol dependence literature, relapse is commonly termed as being the number of days where consumption exceeds 8 or more alcoholic units on one day for males, or 6 or more alcoholic units on one day for females (Shaw *et al.*, 2000).

There are obvious limitations to this description, such as the exclusion of smaller but significant periods of alcohol consumption. For example, an occasion where an individual consumes 7 alcoholic units (for males) would not be termed a relapse under the aforementioned description. However, given the major challenge of finding an operational definition of relapse that is acceptable to researchers and clinicians alike, in order to explore the nature of relapse a definition must be used.

Alcohol dependence can directly lead to a number of problems that appear to significantly compromise an individual's ability to remain abstinent. For example, a

cognitive deficit following alcohol related brain damage could leave an individual less able to apply any of the skills they have learned during treatment, or could detrimentally affect their ability to remember important factors such as triggers for relapse. In turn this could eventually lead to a return to drinking. There appears to be a number of factors that influences relapse in alcohol dependence. The identification of these factors shall be the main focus of the current study.

### **1.1.5. Individual and societal effects of alcohol dependence**

Alcohol dependence can result in a number of serious consequences for the individual. These include physical complications such as liver disease, gastrointestinal problems, and neurological difficulties (Arria & Van Thiel, 1992). Untreated alcohol dependence results in levels of drinking which substantially increase the risk of stroke, cirrhosis of the liver, brain damage, cancer and is associated with increased mortality (Slattery *et al.*, 2003). Alcohol dependence also has adverse social effects such as employment problems (Caetano, 1993), and psychological consequences, including psychiatric disorders (Chick, 1999a)

In addition to the serious effects of alcohol dependence for the individual, there is a large cost for society as a whole. One in forty deaths in Scotland is attributed to alcohol dependence (SACAM, 2002). Further to this, an estimated 0.7 per cent of all General Practitioner consultations and three per cent of acute hospital admissions in Scotland were for alcohol dependence. Direct costs of alcohol dependence (£449 million annually) to health, social work and criminal justice systems are more than

that of drug dependence (£382 million) (Scottish Executive, 2005). Given these figures it is clear that alcohol dependence in Scotland is accompanied by adverse costs for society as a whole.

#### **1.1.6. Cultural explanations of alcohol dependence**

The current definition of alcohol dependence is framed in terms of a biopsychosocial model. However, historically alcohol dependence has been viewed differently. Almost every culture makes reference to the properties of alcohol. For example, in the Old Testament reference is made to the virtues of alcohol; 'it gives courage and enables the poor and unhappy to forget their trials' (Psalms 104:15).

The term alcoholism was first used in 1849 by the physician Magnus Huss to describe the systematic adverse effects of alcohol (Huss, 1849). Following on from this, Jellinek proposed the disease theory of alcoholism (Jellinek, 1960). This implied that alcohol dependence was a symptom of an illness over which an individual had little control. The conception of this explanation was proposed at a time when the Alcoholics Anonymous (AA) movement was prominent within society.

AA is an informal meeting society for recovering alcoholics with the goal of total abstinence. AA regards alcohol dependence or alcoholism as a disease and uses the concept to challenge the belief of alcoholics that they can stay sober by other methods, such as by medical or psychological means (Alcoholics Anonymous, 2001). In addition to regarding alcoholism as a disease, AA also states that the illness

of alcoholism contains a spiritual and moral dimension (Roehre, 2004). This has been subject to criticism in terms of the applicability and efficacy of attributing health related behaviour change to a belief in a higher power (Brandsma, 1976).

The disease theory of alcoholism was challenged by the phenomena of normal drinking within recovered alcoholics (Davies, 1962) and the controlled/social drinking debate (Sobell & Sobell 1973). This appeared to place more emphasis on the choice and power of the individual regarding their alcohol use. The social drinking debate also served as a criticism of abstinence as a treatment goal, as promoted by the disease concept of alcoholism (Edwards, 2008). For example, a 2002 American study by the National Institute on Alcohol Abuse and Alcoholism (NIAAA) showed that approximately 17 per cent of individuals returned to social drinking within one year of abstinence and did not exhibit the symptoms of dependency (Dawson *et al.*, 2005). The concept of social drinking paved the way for the current disorder/dependence explanation as outlined within Table 1.

#### **1.1.7 Social factors related to alcohol dependence**

A number of familial, social and contextual factors can influence the development and maintenance of alcohol dependence. Social support has been identified as being an important factor in maintaining sobriety (Meltzer *et al.*, 1995) with the type of support offered by a family or significant other an important factor. This includes practical assistance in terms of maintaining daily functioning (e.g. monitoring medication), emotional support (Tuck & Jackson, 1991), and supporting other family

members. For example, it is beneficial for children to be involved in treatment programmes to help break inter-generational patterns of alcohol misuse (Stockwell *et al.*, 2005). Consistent family relations and a supportive environment are most strongly linked to lower levels of drinking (McKenzie & Haw, 2006).

Social context and drinking culture are also important factors that can influence the likelihood of relapse (Chick, 1999b). A variety of elements contribute to recent changes in drinking culture, including the diversification of the alcohol product base and aggressive advertising and the marketing of alcohol products (Stockwell, 2007).

Environmental factors such as location have also been shown to be influential on alcohol misuse and relapse. For example, urban environments are associated with high rates of alcohol misuse in young people (Edwards, 2007).

#### **1.1.8. Psychological concepts relevant to alcohol dependence**

Attitudes towards alcohol can impact on how an individual uses the substance. The 2004 Scottish Social Attitudes Survey (Bromley & Ormston, 2005) included a module of questions on alcohol and alcohol-related issues. Two-thirds of the sample agreed that 'Drinking is a major part of the Scottish way of life' and half of men viewed alcohol as a 'social lubricant'. The survey also highlighted the perception of stigma attached to not drinking (Stockwell *et al.*, 2004). A study conducted by MacAskill and colleagues further highlighted this, finding that drinking alcohol and intoxication were perceived as a social norm (MacAskill *et al.*, 2001).

In addition to more generic beliefs, specific beliefs related to health have been shown to influence alcohol consumption and relapse in dependence. For example, holding the belief that ‘excessive drinking can cause cirrhosis of the liver’ is associated with reduced alcohol consumption in individuals with alcohol dependence (Ruchlin, 1997).

The nature of the decision making process has also been commented on with regards to alcohol dependence. Decisions to consume alcohol are often the result of a reasoned assessment of the positive and negative consequences of drinking (Gerrard *et al.*, 1996) in line with reasoned action theory (Furby & Beyth-Marom, 1992) and the theory of planned behaviour (Ajzen, 1985). These theoretical standpoints postulate that intention to perform behaviour, such as consumption of alcohol, can be predicted from a number of factors. For example, attitudes towards a behaviour measures the extent to which an individual has a favourable or unfavourable evaluation of the behaviour in question (Ajzen & Fishbein, 1980). That is, attitudes towards alcohol are indicators of level of consumption, misuse, and dependence. In the context of alcohol dependence intention has been shown to explain approximately 30 per cent of variance in alcohol misuse (Marcoux & Shope, 1997).

### **1.1.9 Gender**

It is widely reported that women consume less alcohol than men and have a lower prevalence of alcohol dependence. Ely and colleagues found that 80 per cent of women with alcohol dependence reported drinking more than seven units a day, in

comparison to the average of nine units a day for men (Ely *et al.* 1999). This would suggest that levels of consumption in women are similar to those in men. Given that women possess a greater physiological sensitivity to the effects of alcohol (Ely *et al.*, 1999), it may be that they will experience more serious consequences of alcohol misuse in the future. In particular, women achieve higher concentrations of alcohol in the blood and become more impaired than men after drinking equivalent amounts of alcohol (Frezza *et al.*, 1990). Research also suggests that women are more susceptible than men to alcohol-related organ damage (Taylor *et al.*, 1996). With regards to social context, some studies indicate that women are more likely to drink alone, and have less social support available to them (Dawson, 1992).

Several reasons have been proposed to explain the differential in alcohol dependence between men and women. Gender differences in alcohol dependence may reflect societal differences in general, and may not be specific to alcohol misuse. For example, social networks have been identified as being more important for women (Rubin *et al.*, 1996). Given the damaging effects of alcohol misuse on relationships, such as increased likelihood of arguments with close relatives (Home Office, 2006) it is possible that individuals with alcohol dependence may possess few close relationships. This could explain the increased likelihood of women to drink in isolation given social networks are more important for this group (Dawson, 1992).

It has also been suggested that observed gender differences in alcohol misuse may be due to wider social trends. For example, there is a traditional belief that alcohol misuse is a 'male vice', which may explain the increased consumption rates in males

(Booth *et al.*, 1991). Further to this, the apparent increase in female drinking has been attributed to changes in the roles of women, especially those that involve exposure to formerly masculine environments and roles (Glenn & Parsons, 1991). Thus, there is a number of competing explanations for any apparent gender differences in both alcohol misuse and dependence.

In broader terms, the influence of individual and societal factors on alcohol dependence and specifically relapse appear to be significant. Within the current study, a continuation of the investigation of which factors are most influential is the main area of focus.

## **1.2 Factors contributing to relapse**

### **1.2.1 Physical health problems resulting from alcohol dependence**

#### *1.2.1.1 Association with alcohol dependence*

A number of physical health problems can result from alcohol dependence. These include pancreatitis, polyneuropathy, alcoholic dementia, heart disease, and cirrhosis of the liver (Chick & Kemppainen, 2007).

In particular, liver dysfunction has been strongly linked as a direct effect of alcohol

dependence (Schafer *et al.*, 1991; Kelly *et al.*, 2006). For this reason, liver dysfunction was considered as a central factor to examine within the current study.

In addition to the direct link between alcohol dependence and liver dysfunction, there is evidence of an association between liver dysfunction and cognitive functioning (Smith *et al.*, 2006). For example, Richardson *et al.* (1991) found that alcohol dependent individuals presenting with liver dysfunction were impaired on a variety of cognitive tests. Given that cognitive functioning is an influential factor in ability to remain abstinent from alcohol (Mann *et al.*, 1999), this offered further evidence to concentrate on liver dysfunction in the current study.

An additional reason to focus on this area was that liver function is routinely measured in patients attending the treatment unit where the current study was carried out, and was therefore more readily available than other measures of physical health such as heart disease.

#### *1.2.1.2 Association with relapse in alcohol dependence*

Physical health problems can influence the likelihood of relapse. A poor prognosis in terms of health recovery could lead to relapse within this group and the presence of physical symptoms may play a role in the initiation or maintenance of abstinence (Tracy *et al.*, 1992). The nature of a physical health difficulty may also result in a deficit that increases the likelihood of relapse, such as a memory deficiency in the case of alcoholic dementia.

## **1.2.2 Cognitive deficits in alcohol dependence**

### *1.2.2.1 Association with alcohol dependence*

Consuming large amounts of alcohol over a period of time can impair normal brain development (Tapert *et al.*, 2001). Indeed, long term alcohol misuse and dependence can result in brain damage, as in the case of Korsakoff's syndrome, a degenerative brain disorder caused by the lack of thiamine in the brain (Kopelman, 1995).

With regards to specific cognitive deficits, alcohol dependence has an established association with deficits in memory and executive dysfunction (Kolb & Whishaw, 1996). For example, alcohol dependence has been linked to short-term memory and learning problems and difficulties with verbal memory tasks (Tracy & Bates, 1999). Deficits in a number of other areas of cognitive functioning have been reported including problem solving, verbal and non-verbal abstraction, and visual-motor coordination (Parsons, 1998).

Davies *et al.*, (2005) examined neuropsychological performance in abstinent alcohol dependent participants. They found evidence of frontal lobe dysfunction using the Trail Making Task and Digit Symbol subtest from the Wechsler Adult Intelligence Scale III. These findings are consistent with previous studies such as Moselhy *et al.*, (2001). Davies and colleagues used an extensive battery of tests to examine neuropsychological performance in this group, including five sub-tests from the Wechsler Adult Intelligence Scale, and the Wechsler Memory Scale (Davies *et al.*,

2005). However, there were some questions over the methodology of this study, with testing taking place when participants had been abstinent from alcohol for at least three months. Improvement in neuropsychological test performance has been shown to improve rapidly through the first six weeks following cessation of drinking, and to a maximum in performance at the six week period (Mann *et al.*, 1999). Given that Davies and colleagues appeared to test participants when they were at their maximum ability, that is, following the six week period, this limits the scope of their findings (Davies *et al.*, 2005). A large part of recovery in alcohol dependence occurs within the period following cessation of drinking, including the initial six week period where cognitive functioning is improving. As Davies and colleagues tested when participants had exceeded this period, their findings would seem to have limited applicability to treatment strategies during this time (Davies *et al.*, 2005).

Several distinct patterns of cognitive deficits can occur as a direct result of alcohol dependence. These include alcoholic dementia, and Korsakoff's psychosis (Lezak, 1995). Substance induced persisting amnesic disorder is the term that describes alcohol related brain damage within the Diagnostic and Statistical Manual of Mental Disorders IV (APA, 1994). This can be summarised as "the development of impairment in ability to learn new information or in-ability to recall previously learned information. This must be etiologically related to the persisting effects of a substance use, and not during the course of a delirium or dementia" (APA, 1994, p. 96). Estimates of prevalence of these disorders vary widely, with Chiang (2002) suggesting that there may be under-reporting of certain chronic alcohol induced conditions, in particular Korsakoff's syndrome (Kopelman, 1995). Ramayya and

Jauhar (1997) highlighted a sharp increase in presentation of Korsakoff's syndrome in East Glasgow in recent years, rising from 12.5 per million in 1990 to 81.25 per million in 1995. This is amongst the highest incidence reported anywhere in the world (Slattery *et al.*, 2003) with prevalence in Scotland appearing to increase (McCreadie *et al.*, 1991). These findings may indicate that the reported increases in alcohol consumption noted earlier (Office for National Statistics, 2000) are leading to physical and mental health problems in some individuals. However, these studies focused on a minority group, including homeless males who resided in an economically deprived area, and did not receive a high standard of health care. Thus, it could be that the reported increases in prevalence of alcohol related brain damage are due to increased detection as opposed to real increases.

In severe cases of alcohol dependence, more serious and debilitating cognitive deficits may be evident, including Korsakoff's syndrome (Kopelman, 1995) and alcohol-related dementia. Oscar-Berman (2002) suggests there are differences in cognitive deficits between these groups. In particular, abnormalities of frontal system functioning are most apparent in Korsakoff's syndrome than in non-Korsakoff individuals with alcohol dependence (Oscar-Berman, 2002). Although this latter study highlighted the differences between alcohol related cognitive impairment and Korsakoff's syndrome, the author acknowledges there were similarities between these groups. For example, the non-Korsakoff group performed slowly on the Trail Making Test part B, in a similar fashion to the Korsakoff's group (Oscar-Berman, 2002). There were also similarities between groups in terms of emotional apathy, and disinhibition, both of which are indicators of a frontal lobe deficit, and are features of

Korsakoff's syndrome (Cox *et al.*, 2004).

Although there are clear links between alcohol dependence and cognitive impairment, the precise nature of these relationships can be difficult to categorise. Following a prolonged period of drinking certain aspects of cognitive functioning can remain intact, such as language, whereas others, for example, planning, can be severely impaired. While it has been established that alcohol is itself a neurotoxin, the precise mechanisms that can lead to impairment are not known (Eckardt *et al.*, 1995). Several factors have been linked to level of cognitive deficits in alcohol dependence. These include quantity of alcohol intake (Giancola, 2007; Senbanjo *et al.*, 2006), duration of drinking problem (Hingson, 2006), and age (Eckardt *et al.*, 1995). Cognitive deficits may arise through a number of indirect and direct causes, including toxic effects of alcohol or withdrawal, associated deficiency of vitamins, or via cirrhosis of the liver (Richardson *et al.*, 1991). Severe chronic use of alcohol is known to induce neurotoxicity (Adams *et al.*, 1993; Ratti *et al.*, 1999) and may produce irreversible damage to the brain.

Executive dysfunction is amongst the most common cognitive impairment that may persist in alcohol dependence. Executive functioning can be defined as comprising working memory, inhibitory abilities and multitasking (Shallice, 1988). The link between executive dysfunction and alcohol dependence has been shown in a number of studies, including individuals who have suffered a stroke (Nys *et al.*, 2007), and with other substance misuse disorders including cannabis and ecstasy (Medina & Shear, 2007). Zinn and colleagues found impairment in alcohol dependence in the

areas of abstract reasoning, memory discrimination, and effectiveness on timed tasks (i.e. executive dysfunction) (Zinn *et al.*, 2004). The latter study also examined medication being taken by participants around the time of testing. These included anti-depressants and benzodiazepines, both of which can affect cognitive functioning in substance misuse (Verdejo *et al.*, 2005). The effects of medication were controlled by Zinn and colleagues using statistical tests, which concluded that medication use did not affect performance in either the alcohol dependent or the control group of participants (Zinn *et al.*, 2004). However, given the broad base of evidence that links poor cognitive functioning with medication use, this may have been difficult to control for. Interestingly, Zinn and colleagues also examined participant self-perception of their apparent cognitive deficits. Participants were more likely to perceive themselves as cognitively impaired which may have influenced cognitive performance given that self-perception has been shown to impact actual performance (Shelton & Parsons, 2006).

Other studies have also examined the relationship between alcohol dependence and executive dysfunction. Duka and colleagues compared a group who met the criterion for harmful drinking, to participants with alcohol dependence (Duka *et al.*, 2003). The results showed more pronounced evidence of cognitive impairment in alcohol dependence. However, there were some areas where there was no significant difference between groups, particularly on the colour Stroop test (Stroop, 1935), which is a measure of executive dysfunction (Rossi *et al.*, 1997). This contrasts with much of the research evidence, which suggests that executive dysfunction is linked with alcohol dependence, as illustrated by Zinn *et al.* (2004). Some of the findings of

Duka *et al.* (2003) may be partially explained by the lack of homogeneity between groups. In the alcohol dependence group, participants were separated in terms of previous service involvement as a measure of dependence severity. The two groups consisted of participants with fewer than two medically supervised detoxifications and those with two or more such detoxifications. Within the control group, who met the criterion for harmful drinking (World Health Organisation, 1992), there were a strong proportion of participants who currently smoked cannabis. This may have influenced overall cognitive performance, including the perceived poor performance on the Stroop test given the established effects of cannabis use on cognitive functioning (Kessler *et al.*, 1994).

To summarise, there appears to be an established link between cognitive dysfunction and alcohol dependence, with particular reference to the areas of executive dysfunction and memory.

#### *1.2.2.2 Association with relapse in alcohol dependence*

Deficits in cognitive functioning can impair ability to function and consequently may increase the likelihood of relapse (McIntosh & Chick, 2006). For example, a deficit in executive functioning could result in an increase in disinhibited behaviour. In turn, this could lead to an increase in encounters with alcohol simply due to a lack of insight of the consequence of the behaviour or impulse control.

There is evidence that excessive alcohol consumption is associated with an increased

likelihood of cognitive impairment that can persist for considerable durations after drinking cessation (Eckardt *et al.*, 1995), which is associated with relapse (Rourke & Loberg, 1996). Eckardt and colleagues (1995) focused on participants aged between 18 and 35 years, which may limit the findings of this research, given that many alcohol dependent individuals fall beyond this age range (Dong & Erens, 1997). In addition to this, the sample of this study was made up of army personnel, which may influence how generalisable the findings are, and the battery of tests administered took place over two days, which could have influenced test results given possible differences in presentation over this period due to a number of factors, such as medication or mood. Aside from these methodological criticisms, Eckardt *et al.* (1990) demonstrated that cognitive deficits can persist up to a year following abstinence in alcohol dependence.

Cognitive impairment in alcohol dependence can affect treatment success and lead to relapse. Smith and McCrady (1991) found that patients who scored higher on abstract reasoning ability were better able to learn coping skills during treatment than patients with lower cognitive functioning on such a test. This implies that if patients are suffering from deficits in cognitive functioning, it is important these are identified at an early stage if potential rehabilitation is to take place. Recovery from alcohol related cognitive impairments is varied, with estimates indicating that 25 per cent make a complete recovery; 25 per cent make a significant recovery, and 25 to 50 per cent make no recovery (Smith & Hillman, 1999).

Impaired cognitive functioning can influence a variety of processes, which in turn

can detrimentally affect abstinence outcome. These include planning (Smith & McCrady, 1991), verbal memory (Brown *et al.*, 2003), and problem solving skills (Cordosi, 2004). Executive function deficits are among the cognitive impairments that are most likely to affect rehabilitation success (Ihara *et al.*, 2000). As executive functions are linked with skills that are essential to daily living, such as planning or multi-tasking, this may not be surprising. Impairment of executive functions in alcohol dependent participants has been associated with attrition from rehabilitation and higher rates of relapse (Miller, 1991), as well as with social difficulties such as increased marital disruption (Tuck & Jackson, 1991) and employment failure (Moriyama *et al.*, 2002), all of which are predictive of poor treatment outcomes including relapse.

### **1.2.3 Psychiatric disorders**

#### *1.2.3.1 Association with alcohol dependence*

Surveys show that about a third of psychiatric patients also meet the criterion for alcohol dependence, commonly termed co-morbidity (Lynskey, 1998; SACAM, 2002). The Greater Glasgow Alcohol Strategy commented that the proportion of patients in psychiatric hospitals where psychiatric disorder is complicated by harmful drinking or alcohol dependence is approximately 75 per cent (Greater Glasgow Health Board, 2000).

Co-morbidity is also common amongst individuals with a primary diagnosis of

alcohol dependence who experience psychiatric problems (Grant & Harford, 1995). For example, up to 50 per cent with alcohol dependence have a concurrent diagnosis of personality disorder (Hasin *et al.*, 2002). The types of mental health problems in those treated for alcohol dependence also include depression and anxiety, with strong associations between alcohol misuse and trauma, eating disorders and self-harm (Department of Health, 2004). Alcohol dependence is also associated with high rates of completed suicide (Raistrick *et al.*, 2006).

There are two major American studies that have considered psychiatric co-morbidity with alcohol dependence. The first was the Epidemiologic catchments area (ECA) Survey (Regier *et al.*, 1990), in which 18, 571 respondents were interviewed in a series of community studies in the early 1980s. The second was the National co morbidity survey (NCS), a nationally representative sample of 8098 respondents conducted in 1991 (Kessler *et al.*, 1994). Estimates of the lifetime prevalence of alcohol dependence and major depression derived from the ECA studies varied from 10.7 to 15.9 per cent between study sites (Kushner *et al.*, 2000). Similar estimates of alcohol misuse and psychiatric co-morbidity have been reported in other studies, in locations such as Puerto Rico (Weissman *et al.*, 1996) and Australia (Bloomfield *et al.*, 2003).

Within the UK, the Co-morbidity of Substance Misuse and Mental Illness Collaborative (COSMIC) study has generated detailed prevalence data (Department of Health, 2004). Interviews were conducted with 400 mental health and 353 substance misuse patients, all from NHS provider agencies. Of the community and

mental health patients, 44 per cent reported a past year problem of illicit drug use or alcohol dependence. Of the alcohol service patients, 85 per cent had met diagnosis for a psychiatric disorder within the past year.

Depression may occur at a higher rate in alcohol dependence as a result of the poor social outcomes that are associated with the disorder (Schuckit *et al.*, 1997). Concurrently alcohol may serve as a coping mechanism for individuals with depression as a form of self medication (Chutuape & De Wit, 1995). It is also possible that alcohol dependence may increase the likelihood of depression due to biological factors. Withdrawal symptoms experienced following cessation of drinking alcohol such as delirium tremens can lead to hallucinations and low mood (Raistrick *et al.*, 2006). The stress experienced during the physical withdrawal process can result in mental health problems such as depression (Johann *et al.*, 2007).

In addition to the influence of depression on relapse, there are other psychiatric factors that are influential. The association between anxiety and alcohol dependence is well established (Allan, 1995; Brady & Lydiard, 1993; Cox *et al.*, 1990). The ECA and NCS surveys also looked at prevalence of anxiety disorders, in addition to depression. Comparisons between the ECA and NCS surveys show similar findings for anxiety disorders (Kushner *et al.*, 2000).

High rates (over 50 per cent) of co-morbid anxiety disorders have been found in clinical samples of alcohol dependence in addition to the community based samples of the ECA and NCS surveys. Kushner and colleagues (2005) found that those with

anxiety disorder at baseline were more likely to meet definitions of drinking relapse over the course of follow up. In particular, those with generalised anxiety disorder were more likely than others to meet definitions of drinking relapse, with social anxiety disorder being the next best predictor followed by panic disorder. The participants of the study by Kushner *et al.* (2005) consisted of individuals who were assessed for anxiety symptoms one week after entering detoxification treatment. The assessment took the form of a structured clinical interview, based on criterion for DSM-IV (APA, 2000). This methodology could have influenced the number of participants who reported symptoms of anxiety at this point, especially as they may have still have been suffering the effects of alcohol withdrawal. The criterion for alcohol withdrawal includes many features that could be mistaken for symptoms of anxiety (Toneatto, 2005). Thus, it is also possible that Kushner and colleagues could have over-reported anxiety disorders for participants given a diagnosis during the first week of detoxification from alcohol (Kushner *et al.*, 2005).

The manner in which anxiety is categorised throughout much of the literature has been criticised by Kushner and colleagues (Kushner *et al.*, 2000). They state that many studies use a diagnosis of an anxiety disorder at some point over the life of the individual as the criterion for inclusion. This may neglect to include individuals who are experiencing state anxiety at a significant level for the first time, which may weigh in favour of using a quantitative measure of anxiety symptoms.

Some studies have shown differences in terms of types of anxiety disorders that were most likely to be associated with alcohol dependence. For example, Regier and

colleagues reported that in the ECA survey, those with “any anxiety disorder,” as compared to the rest of the sample, had a fifty per cent increase in the likelihood of being diagnosed with alcohol dependence, with panic disorder presenting an even greater increase in the likelihood of being diagnosed with alcohol dependence (Regier *et al.*, 1990). In contrast to this, Himle and Hill (1991) analysed co-morbidity prevalence in the ECA for the separate phobic disorders. They reported an approximate twofold increase in the likelihood of being diagnosed with alcohol dependence among those with agoraphobia and social phobia. The aforementioned differences in diagnostic specificity have also been demonstrated in other studies where significant differences in co-morbidity rates among various anxiety disorders were shown (Cox *et al.*, 1990).

As in the case of depression, there is much debate over the possible reasons for the high rates of co-morbidity between alcohol dependence and anxiety disorder. Kushner *et al.* (2000) argue that there are a number of potential explanations. For example, anxiety disorders may promote alcohol misuse as a form of self-medication. A person with social anxiety who is reluctant to leave the house may find the disinhibiting effect of alcohol a useful coping mechanism in social situations. In turn this could lead them to regularly consume alcohol, which may eventually result in dependence. However, Kushner and colleagues also state that no consensus has been achieved despite the wealth of research being carried out in the area (Kushner *et al.*, 2000).

### 1.2.3.2 Association with relapse in alcohol dependence

The co-occurrence of psychiatric disorder and alcohol dependence has implications for treatment strategies and relapse (Lynskey, 1998). Hasin *et al.* (2002) looked at the effects of major depression on relapse, concluding that depressive episodes were an important factor in relapse within alcohol dependence. The results of this study must be treated with caution however, as many of the participants had co-morbid drug dependences. This may have affected relapse rates and served as a confounding variable to explain relapse, as opposed to depression. Greenfield and colleagues found that a diagnosis of major depression was associated with shorter times to first drink and relapse within alcohol dependence (Greenfield *et al.*, 1998). Interestingly, a diagnosis of major depression, as defined by DSM-IV (APA, 2000) using a structured interview, did predict relapse in alcohol dependence. However, depressive symptoms as measured by the Beck Depression Inventory (Beck *et al.*, 1996) did not predict relapse. The Beck Depression Inventory has been shown to be a reliable measure of depressive symptoms in several studies (Weiss *et al.*, 1989), thus it is puzzling why there was a difference in prediction of relapse between this quantitative measure, and one of a clinical diagnosis.

In contrast to these findings, some studies have questioned the relationship between alcohol dependence, depression, and relapse. Sellman and Joyce (1996) found that neither lifetime major depression nor presence of depressive symptoms were indicators of relapse to drinking at six months. Both a diagnosis of lifetime major depression, in addition to a measure of depressive symptoms was used to quantify

mood in this latter study. Other studies have also suggested that those who are depressed consume no more alcohol than the non-depressed (Meltzer *et al.*, 1995). The aforementioned research highlights the clinical relevance of co-morbidity as adversely affecting the course, treatment and prognosis of both alcohol dependence and psychiatric disorder.

Individuals with mental health problems may be less likely to remain abstinent from alcohol (Lynskey, 1998). In the case of depression this may relate to the fact that depression is often accompanied with reduced activity and reduced self efficacy. This may compromise attendance at an alcohol dependence treatment programme. An additional reason to focus on depression and relapse is the rate of suicide within alcohol dependence. The five year report of the National Confidential Inquiry (NCI) (Appleby *et al.*, 2001) into suicide by people with mental illness in England and Wales reported that 27 per cent of patients who died had a dual diagnosis of severe mental illness and alcohol dependence. A review of 386 suicide cases that had occurred between 1988 and 1995 found that forty five per cent had consumed alcohol and nineteen per cent were drunk at the time of suicide (Crombie *et al.*, 1997; 1998). An inquiry into suicide and homicide found that fifty three percent of people in Scotland who committed suicide had a history of alcohol misuse (Appleby *et al.*, 2001).

As with depression, there is also evidence that anxiety disorders are associated with increased likelihood of relapse following a period of drinking cessation (Willinger *et al.*, 2002). The finding that anxiety may be present in individuals who are more

likely to relapse to drinking behaviour has been displayed in a number of studies (Brown *et al.*, 1995, Schade *et al.*, 2005, Tomasson & Vaglum, 1996). For example, agoraphobia was reported to increase the chances of being readmitted after alcohol detoxification (Tomasson & Vaglum, 1998).

## **1.2.4 General well-being and quality of life**

### *1.2.4.1 Association with alcohol dependence*

Given the adverse physical, psychological, social, and economic consequences of alcohol dependence, it is not surprising that psychological well being is poor in this group (McKenna *et al.*, 1996). Within the literature, there is evidence of a strong link between alcohol dependence and quality of life (Foster *et al.*, 1999).

Poor quality of life appears to be an essential component of alcohol dependence, with the concept of health-related quality of life referring to a person's perceived physical and mental health over a certain period of time. The DSM-IV definition of alcohol dependence highlights this, with five of the nine items covered being the social, familial, and occupational consequences of alcohol consumption (APA, 2000). Senbanjo and colleagues found that excessive alcohol consumption was associated with impairments in quality of life (Senbanjo *et al.*, 2006). However, it should be noted that this study did not examine alcohol dependence specifically and used consumption of alcohol as a marker for dependence. In turn, this may underestimate any perceived relationship between actual dependence and quality of life, which

could actually be more significant.

Rosenbloom and colleagues examined health related quality of life within a group who had a diagnosis of the Human Immunodeficiency Virus (HIV) and alcohol dependence using the World Health Organisation Quality of life scale (World Health Organisation, 1993) (Rosenbloom *et al.*, 2007). They found that presence of both of these conditions detrimentally affected quality of life, but that ratings of quality of life appeared to be more strongly associated with alcohol dependence alone. This study also examined the influence of potential confounding influences such as cognitive impairment and mood, indicating that alcohol dependence is a major contributing factor to poorer quality of life.

Within the alcohol dependence field, a number of different measures have been used to assess quality of life, including the World Health Organisation Quality of life brief version (WHOQoL – BREF) (World Health Organisation, 1993) as demonstrated by da Silva Lima *et al.* (2005), and the EQ-5D (EuroQoL Group, 1990), which was used by Gunther *et al.* (2005). The EQ-5D has been cited as being one of the most widely used measures of Quality of life (Saarni *et al.*, 2007).

Recently, the Alcohol related problems questionnaire (ARPQ) (Patience *et al.*, 1997) has been put forward as a measure of quality of life. ARPQ scores have been shown to indicate that difficulties with daily functioning are associated with lower quality of life and correlated with measures of alcohol dependence (Kiritze-Topor *et al.*, 2004). That is, the ARPQ may serve as a proxy for quality of life in alcohol treatment

(Patience *et al.*, 1997).

#### *1.2.4.1 Association with relapse in alcohol dependence*

Evidence suggests that quality of life measures are sensitive to alcohol misuse and dependence (Foster, *et al.*, 1999). It may be that the temporality between alcohol dependence and lower levels of quality of life can be attributed to the adverse psychiatric and physical health problems associated with alcohol dependence, as discussed previously, and may lead to relapse.

### **1.2.5 Self efficacy and motivation**

#### *1.2.5.1 Association with alcohol dependence*

The mechanisms behind the link between self efficacy and alcohol dependence were initially proposed by Bandura. He noted that low self-efficacy is a cognitive mediator of relapse to drinking in alcohol dependence (Bandura 1977) and linked perceived confidence with behavioural change. Motivation to change behaviour and confidence in one's ability to do so can affect the likelihood of remaining abstinent from alcohol. An increased level of self efficacy, or over-confidence, could result in an individual over estimating their ability to remain sober. Concurrently, low confidence in one's ability to maintain sobriety could also result in a similarly poor outcome (Miller & Rollnick, 2002).

A number of studies show abstinent participants with a history of alcohol dependence display greater levels of self-efficacy than participants who relapse into previous drinking behaviour. Self-efficacy has been shown to discriminate alcohol dependent participants who maintained abstinence from those who did not (Vielva & Iraurgi, 2001). Although the latter study identified self-efficacy as being the major predictor of abstinence within their study, there were several factors that may also have influenced this outcome. The majority of participants appeared to have long standing alcohol dependence, with mean duration of alcohol misuse being 144.3 months, longer than ten years. It is possible that by including participants with long standing problems, other factors such as well developed coping skills or increased social support networks may have helped to increase length of abstinence in this group. In addition to this, the sample within the study by Vielva and Iraurgi (2001) included a mixture of participants who were involved in government health care programmes and those attending Alcoholics Anonymous (AA). The differences between these approaches may have influenced length of abstinence for participants. For example, individuals attending AA would have no direct access to professional therapeutic support within their organisation, aside from the other individuals attending the group. This may have led to an increase in relapse rates within participants attending AA. Despite these methodological criticisms, Vielva and Iraurgi (2001) identified self efficacy as being the strongest predictor of abstinence when compared to other cognitive and behavioural factors, as shown elsewhere (Long *et al.*, 2000).

#### 1.2.5.2 Association with relapse in alcohol dependence

Poor self efficacy or confidence in one's ability to abstain from drinking alcohol has been associated with relapse following a period of drinking cessation (Connors *et al.*, 1996; Goldbeck *et al.*, 1997). Alcohol dependence has been linked with high self-efficacy and is shown to be predictive of later heavy drinking. In particular, individuals with alcohol dependence tend to be more optimistic in predicting favourable treatment outcomes for themselves (Demmel & Beck, 2004). However, the predictive power of self-efficacy is limited by an 'inverted U-shaped curve' since patients who in treatment for alcohol dependence tend to be overconfident. In general, overconfidence appears to be a common response to lack of success in health behaviour change, as relapse may happen several times before achieving sustained behaviour change (Prochaska *et al.*, 1992). The influence of gender within studies examining the relationship between self efficacy and relapse is commented on by Blomqvist *et al.* (2003). Some of the studies mentioned here, such as Demmel and Beck (2004), and Vielva and Iraurgi (2001) were conducted with samples that were predominately male. Women may be more likely to experience greater confidence in managing positive emotional states than men (Skutle 1999), and therefore may experience increased levels of self efficacy, which could influence any trends within the results of studies that do not account for this. Aside from Skutle's findings, a number of studies found no gender differences in self efficacy (e.g. Blomqvist *et al.*, 2003; Trucco *et al.*, 2007).

## **1.3 Aims of the study**

The broad aim of this study was to investigate potential predictors of relapse in alcohol dependence. For the purposes of the current study the areas of interest were those that appeared important from a clinical perspective and had been largely neglected for this group in terms of research. Although there has been a large amount of research carried out in alcohol dependence, there has been no previous research examining relapse after release from hospital in severe alcohol dependant populations of this nature.

### **1.3.1 Definition of problem severity**

The inclusion criterion for this study was a diagnosis of alcohol dependence, in line with ICD-10 criterion, which is a measure of extent of problem severity (World Health Organisation, 1992). Individuals who did not meet the criterion for alcohol dependence were not included in the study.

The setting of the study, an inpatient ward for alcohol dependence, only contained individuals who met this diagnosis. This unit contains individuals with the most serious physical, psychological and social problems that have resulted from their alcohol intake. In effect, they are the most at risk group in society where alcohol consumption is concerned with the greatest relapse rates and have been largely neglected within the existing evidence base (Arria & Van Thiel, 1992).

The definition of alcohol dependence commonly used within both clinical and research settings within the U.K applies the diagnostic categories of the International Classification of Disease (ICD-10) (World Health Organisation, 1992). This requires the presence of three or more of the following for a diagnosis of dependence:

- a strong desire or sense of compulsion to take alcohol
- impaired capacity to control alcohol taking behaviour
- a physiological withdrawal state
- evidence of tolerance to the effects of alcohol
- preoccupation with alcohol use (to the detriment of alternative pleasures or interests)
- persistent alcohol use despite clear evidence of harmful consequences

### **1.3.2 Definition of relapse**

Within the current study relapse is defined as the consumption of eight or more alcoholic units on one day for males, or six or more alcoholic units on one day for females (Shaw *et al.*, 2000). Relapse was measured in terms of the number of days where alcohol had been consumed at these levels. Individuals are considered to be abstinent if they have had no intake of alcohol throughout the duration of the study. Although this definition is somewhat arbitrary, as outlined earlier, for the purpose of the current study it was appropriate.

### 1.3.3 Hypotheses

A number of factors are identified from the literature as being potentially influential in an individual's ability to remain abstinent from alcohol and avoid relapse; memory and executive functioning, mood, self efficacy, quality of life, and liver function.

The following hypotheses were tested:

1. Deficits in memory and executive functioning at treatment exit<sup>1</sup> will be associated with relapse at three months follow-up.
2. Low mood at treatment exit will be associated with relapse at three months follow-up.
3. Low self efficacy at treatment exit will be associated with relapse at three months follow-up.
4. Low quality of life at treatment exit will be associated with relapse at three months follow-up.
5. Liver dysfunction at treatment exit will be associated with relapse at three months follow-up.

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<sup>1</sup> Treatment exit is defined as a period towards the end of the participants' stay in the in-patient ward, typically around 7 to 10 days following cessation of drinking.

## **2. Methods**

### **2.1 Design**

A correlation and multiple regression design were used. The purpose of this was to learn more about the relationship between predictor variables in the areas of memory and executive functioning, mood, self-efficacy, quality of life and liver function, and the dependent variable of relapse in alcohol dependent individuals.

### **2.2 Inclusion criterion**

The inclusion criterion for the study was a diagnosis of alcohol dependence as defined by ICD-10 (World Health Organisation, 1992) as outlined within the description of alcohol dependence in section 1.2.

Participants were included if they were resident in the alcohol inpatient unit where the study took place. This meant that they met the admission criterion for the unit (Appendix four), which include that the patients are alcohol dependent and at the severe end of the dependence spectrum, suffering more complex physiological, behavioural and cognitive consequences from their alcohol consumption.

## **2.3 Participants**

A total of 54 participants took part in this study. Participants were recruited from an inpatient treatment unit for alcohol dependence. On average there are 8 patients in the unit per week. Individuals typically stay for between 7 to 10 days whilst undergoing detoxification and treatment.

Patients with the following disorders were omitted from the study: history of opiate abuse, current psychosis, any neurological condition affecting cognitive functioning (e.g. epilepsy, Parkinson's disease) and current severe head injury (as defined by presence of coma within the past 14 days). This latter criterion was intended to allow patients with a history of head injury typically found in alcohol dependence to participate in the study, given the high rates reported in this population (Solomon & Malloy, 1992).

## **2.4 Procedure**

Data was collected in the period between October 2006 and September 2007. Participants comprised a sample of patients attending the detoxification unit. The author of the thesis approached all patients who met inclusion criterion for the study when they entered the in-patient detoxification unit and explained the purpose of the study to them. This took approximately ten minutes and potential participants were given an information leaflet and consent form at this point. These potential participants were then approached by the main investigator at least five days

following the initial meeting and asked whether they wished to take part in the study. This allowed them at least five days to consider whether they wished to take part. Participants then completed all measures, which was typically between five and ten days from their admission to the unit. That is, patients were tested on the aforementioned measures towards the end of their stay within the inpatient treatment unit.

Participants were then contacted by telephone at 3 months following their initial testing to investigate outcome and relapse. This was carried out by the main investigator and took a maximum of 10 minutes to complete.

The procedure involved the main investigator asking participants about the number of days they drank alcohol and the number of units they consumed. This was carried out on a retrospective day-by-day basis from the point of contact over the past three months since their initial date of testing. The number of units and days where alcohol was consumed were recorded by the main investigator in a diary format using the Timeline Follow-Back (TLFB) (Sobell *et al.*, 1979b). This was carried out in line with standardised procedure for this measure over the telephone (Connors *et al.*, 1992).

If participants were not contactable by telephone, the main investigator used the local NHS patient information database to attempt to gain contact details. If this was not successful the participant's General Practitioner was contacted.

## **2.5 Measures**

The measures used within the study were a combination of self-report and clinician administered. On average, these measures took approximately 45 minutes to complete.

### **2.5.1 Demographic information**

The demographic information collected consisted of gender, and age. Measures within areas 2.5.2 to 2.5.7 were administered to participants in the clinic. This occurred seven to ten days after the initial meeting with the main investigator. The nature of the study was explained to participants at the meeting.

### **2.5.2 Alcohol dependence**

In addition to this clinical rating of alcohol dependence, an objective measure was also used. The Severity of Alcohol Dependence Questionnaire (SADQ) (Stockwell *et al.*, 1983) is a self-administered, 20-item questionnaire designed by the World Health Organisation to measure severity of dependence on alcohol. The SADQ covers the following aspects of dependency syndrome: physical withdrawal symptoms, affective withdrawal symptoms, relief drinking, frequency of alcohol consumption, and speed of onset of withdrawal symptoms. Using the SADQ, the degree of severity of alcohol dependence can be classified as mild (0 to 16), moderate (16 to 30), and severe (31-60).

### Psychometric properties of the SADQ

The SADQ correlates with other measures of dependence such as the Leeds Dependence Questionnaire (Raistrick *et al.*, 1994), indicating strong construct validity. In addition, it has strong external validity as it correlates with the main clinical diagnosis provided by DSM-IV (Roberts *et al.*, 1999).

### **2.5.3 Relapse**

Relapse was defined as the consumption of eight or more alcoholic units on one day for males, or six or more alcoholic units on one day for females (Shaw *et al.*, 2000). Relapse was measured using the number of days where participants had consumed alcohol at a level that is equivalent or greater to the aforementioned number of daily alcoholic drinks. The measure used to assess this was the Timeline Follow Back procedure.

The Timeline Follow-Back (TLFB) (Sobell *et al.*, 1979b) is a diary where individuals can record the number of days they drink alcohol and the number of units they consume. This is carried out with an administrator who asks respondents to estimate their alcohol consumption retrospectively on a day-by-day basis. This is used to assess quantity and frequency of alcohol intake in terms of number of days drinking. Within this study it was used to assess behaviour in the three months

following testing, as outlined within section 2.4.

#### Psychometric properties of the TLFB

The TLFB has been used as a main outcome variable for alcohol research since its conception in and has been extensively evaluated in a variety of settings, and has been found to have good measurement properties (Sobell & Sobell, 1992; Sobell *et al.*, 1994).

The reliability of the TLFB was assessed by Wennberg and Bohman (1998), who compared two samples on the measure. This showed the results were reproducible and internally consistent, with split-half reliability of 0.88.

In terms of external validity, the TLFB has been shown to be strongly correlated with external measures of alcohol dependence, such as liver functioning (Addiction Research Foundation, 1998) and has been correlated (Pearson correlation = 0.81) with reports of drinking completed by significant others (Sobell *et al.*, 1979b).

#### **2.5.4 Memory and executive functioning**

Two areas of cognitive functioning were examined – memory and executive dysfunction. Deficits in memory and executive dysfunction have been associated with alcohol dependence (Noel *et al.*, 2001; Ratti *et al.*, 1999).

#### *2.5.4.1 Memory*

- Verbal memory

Verbal memory was assessed using the Rey Auditory Verbal Learning Test (RAVLT) (Rey, 1958). This is a simple but effective measure of learning and short term memory, and is routinely used within the treatment service where the current study took place. The RAVLT takes approximately 10 to 15 minutes to administer and consists of five presentations of a 15-word list (List A), followed by a free recall of a second word list (List B), and a sixth recall trial of list A. This give a total recall score (RAVLT Recall). Recognition is tested by asking the respondent to indicate which of 30 words read aloud were from List A (15) and which were not (15), proving a recognition score (RAVLT Recognition).

The RAVLT provides measures of immediate memory, efficiency of learning, effects of interference, and recall following short and long delay periods (Rey, 1958). It has been used within numerous studies in a variety of client groups such as Parkinson's disease, Huntington's disease, closed-head injury or temporal lobe dysfunction (Spren & Strauss, 1998).

Although the RAVLT is a fairly old measure, it was chosen within the current study for a number of reasons. The RAVLT assesses a variety of cognitive functions, such as verbal learning and recognition, over short time period of approximately ten

minutes. This was important in the context of the current study, given the difficulties in engaging the client group.

The RAVLT is well established in alcohol dependence. For example, Brown and colleagues looked at performance on the RAVLT over the course of a 12 week detoxification programme, concluding that performance on this measure was impaired in this group (Brown *et al.*, 2003).

#### Psychometric properties of the RAVLT

The RAVLT correlates with other measures of learning and memory such as the California Verbal Learning Test (Crossen & Wiens, 1994), indicating strong construct validity. It is sensitive to verbal memory deficits in a variety of patient groups such as Parkinson's disease and closed head injury (Spreen & Strauss, 1998). This suggests strong reliability in terms of reproduction of results in different settings.

- Non-verbal memory

Non-verbal memory was assessed using the Rey Osterrieth Complex Figure Test (Rey Complex Figure Test) (Osterrieth, 1944; Rey, 1941). The Rey Complex Figure Test, which was developed by Rey in 1941 and standardized by Osterrieth in 1944, is a widely used neuropsychological test for the evaluation of visuo-spatial

constructional ability and visual memory. Participants are asked to copy a complex shape directly using a pencil and paper method. Following this copy trial (Rey Complex Figure Test Copy), participants are then asked to draw the shape from memory with no stimuli (Rey Complex Figure Test Recall).

A delayed recall trial is also available where participants are asked to draw the shape 30 minutes after originally seeing it. The Rey Complex Figure Test allows a measure of immediate and delayed visual memory, in addition to copy strategy. Generally, the Rey Complex Figure Test has been used for the evaluation of visuo-constructional ability in copy condition, and that of visual memory in recall condition (Meyers & Meyers, 1995). Performance on the memory tasks within this test has been shown to be impaired within the area of alcohol dependence (Savage *et al.*, 1999). Among the various administration procedures for the Rey Complex Figure Test, the most commonly used scoring method is Taylor's method (Taylor, 1959). This scoring system is based on the presence and accuracy of the 18 units of the Rey Complex Figure Test.

The Rey Complex Figure Test was primarily chosen for its sensitivity to non-verbal memory deficits in alcohol dependent individuals and ability to measure impairment of a number of functions within a relatively short period of time of approximately five minutes.

## Psychometric properties of the Rey Complex Figure Test

The Rey Complex Figure Test has strong inter-rater reliability. This was assessed by comparing the ratings of three administrators, who had received expert training in the measure, on a sample of 300 drawings of the complex figure from a variety of samples. The inter-rater reliability coefficients ranged from 0.93 to 0.99, indicating excellent inter-rater reliability for the measure (Meyers & Meyers, 1995).

The temporal stability of the Rey Complex Figure Test is the correlation coefficient between the scores obtained at the first and second testing. The percentage of clinical agreement has been shown to be approximately ninety one per cent, suggesting strong temporal stability (Meyers & Meyers, 1995).

The construct validity of the Rey Complex Figure Test has been measured by comparing it with other cognitive measures. In particular, a strong correlation was observed with the Family pictures sub-test from the Wechsler Memory Scale III (Wechsler, 1997c), a measure of non-verbal memory, indicating the test measures what it is designed to (Meyers & Meyers, 1995).

### *2.5.4.2 Executive functioning*

Executive functioning can be broken up into working memory, inhibitory abilities, and multitasking (Shallice, 1988). Due to the diversity of processes involved in executive function, only a few neuropsychological tests have been developed that

have a high sensitivity and specificity for assessing specific executive dysfunctions (Tranel *et al.*, 1994). For this reason, a number of tests were chosen to assess executive functioning in the current study.

- Working memory

Working memory was measured using the Letter number sequencing test (LNS). The LNS is part of the more comprehensive Wechsler Adult Intelligence Scale III, and is a timed subtest that specifically measures working memory (Wechsler, 1997a). In this test participants are presented with increasingly long strings of letters and numbers and asked to repeat back first the numbers in ascending order and then the letters in alphabetical order. It is an established measure of executive functioning in the area of alcohol misuse (Lysaker *et al.*, 2002; Verdejo *et al.*, 2004).

#### Psychometric properties of the LNS

The construct validity of the LNS has been examined by comparing it with a number of established measures of the abilities that the test is intended to evaluate. This has been carried out successfully against established measures of working memory such as the spatial span sub-test from the Wechsler Memory Scale III (Wechsler, 1997c).

The LNS has been shown to be clinically sensitive to deficits in working memory in individuals with alcohol dependence and Korsakoff's syndrome (Wechsler, 1997b) indicating its usefulness in the current study.

- Inhibitory abilities

Inhibitory abilities were measured using the Trail Making Test part B (Trail Making Test B) and the Controlled Oral Word Association Test (COWAT).

The Trail Making Test B is often used for screening for cognitive impairment (Beckham *et al.*, 1998). It is the second, more complex part of the overall Trail Making Test battery, requiring subjects to alternate between two tasks and is a better measure of inhibitory abilities and multitasking than part A of the battery (Lezak, 1995). For this reason, and due to the need to restrict the number of measures, only part B of the Trail Making Test was used within this study. The Trail Making Test B is sensitive to a variety of neurological impairments and processes (Spreen & Strauss, 1998). Studies have shown that performance on the Trail B can be impaired amongst individuals with alcohol dependence even in the absence of any clinically obvious neurological deficits (Moselhy *et al.*, 2001). These findings have also been confirmed by Noel and colleagues who reported that ‘non-amnesic’ alcohol-dependent subjects were slower on Trails A and B, with greater impairment in completing Trail B (Noel *et al.*, 2001).

The COWAT (Benton *et al.*, 1983) is part of the Multilingual Aphasia Battery, a frequently used measure of a person’s ability to verbally reproduce words and restrict their phonetic classification (Sumerall *et al.*, 1997). Blume and colleagues showed that performance on the COWAT was poor in patients with alcohol dependence (Blume *et al.*, 2005). Moreover, this study also demonstrated that improved

performance on the COWAT predicted reduced drinking at three months following abstinence from alcohol. The COWAT is a measure of verbal fluency, a term used to refer to capacity to generate words according to a category or subcategory in a limited amount of time (Benson & Ardila, 1996). This test employs three trials, of 60 seconds each, in which participants are asked to generate as many words as possible using three letters. To assess subjects' performance on phonemic fluency tasks, examiners are instructed to calculate the total number of acceptable words produced across all three trials. Unacceptable responses occur when a subject repeats a previous response (i.e., a perseveration), or makes an error by including a word that starts with the wrong letter (Benton *et al.*, 1983). Word fluency has been shown to be a sensitive indicator of frontal dysfunction, and executive dysfunction (Lezak, 1995; Spreen & Strauss, 1998).

#### Psychometric properties of Trail Making Test B

The Trail Making Test B has been shown to have strong construct validity. It has been compared to a number of established measures of executive dysfunction such as the Stroop Test (Rossi *et al.*, 1997).

The Trail Making Test B is sensitive to executive dysfunction in a number of groups including alcohol dependence (Spreen & Strauss, 1998). This suggests strong reliability in terms of reproduction of results in different settings.

## Psychometric properties of the COWAT.

The COWAT has good inter-rater reliability with intra-class coefficients ranging from 0.96 to 0.99, indicating a strong level of agreement (Ross *et al.*, 2007). The temporal stability of the COWAT is questionable however with test–retest reliability coefficients ranging from 0.47 to 0.58, possibly suggesting a practice effect (Ross *et al.*, 2007).

- **Multitasking**

Multitasking was measured using the LNS and the Trail Making Test B as outlined previously. In addition to these measures, the Rey Complex Figure Test was used for assessment of multitasking and executive functioning. Although the Rey Complex Figure Test is typically employed as a measure of visuo-constructional ability and visual memory, it also reflects cognitive processes regarding strategies and organisational approach at the time of drawing the figure. It is currently thought that overall copy score on the Rey Complex Figure Test reflects executive functions such as organisation and planning (Shorr *et al.*, 1992).

### **2.5.5 Mood**

Mood was measured using the Hospital Anxiety and Depression Scale (HADS), a self-report measure designed to detect symptoms of state anxiety and depression (Zigmond & Snaith, 1983). The HADS is a 14-item self-report questionnaire

incorporating anxiety and depression subscales. Each item is scored zero to three and a score of eight or greater on one or both of the subscales indicates the presence of a depressive or anxiety disorder. The developers aimed to avoid all ambiguous somatic symptoms such as dizziness and lethargy, thus increasing its validity for use with conditions in which these somatic symptoms may not reflect true depression or anxiety. The depression subscale is comprised around the psychopathology of anhedonia and the anxiety subscale based upon the cognitive symptoms of anxiety (Crawford *et al.*, 2001). The HADS is useful in alcohol dependent subjects as it places less emphasis on the physical symptoms of depression, which can be confused with alcohol withdrawal symptoms due to their similarities (Kramer, 1999).

#### Psychometric properties of the HADS

The HADS has been found to perform reliably in psychiatric and non-psychiatric populations indicating that the measure produces results that are reproducible (Bjelland, *et al.* 2002). The HADS corresponds well with other established measures of mood such as the Beck Depression Inventory (Beck *et al.*, 1996) indicating strong validity (Crawford *et al.*, 2001).

#### **2.5.6 Self efficacy**

Self-efficacy was measured using the Alcohol Abstinence Self Efficacy Scale Temptation subscale (AASE) (DiClemente *et al.*, 1994). Individuals rate self efficacy using five point Likert scales, ranging from not at all (likely to drink) to extremely

(likely to drink) in a number of situations. The AASE assesses self-efficacy and evaluates an individual's confidence to abstain from drinking in 20 situations that represent typical drinking cues. These situations form four subscales comprised of five items each examining cues related to (1) Negative Affect, (2) Social/Positive, (3) Physical and Other Concerns, and (4) Withdrawal and Urges.

#### Psychometric properties of the AASE

The reliability of the AASE has been examined in terms of internal consistency in a method of ranking individual items in terms of difficulty (DiClemente *et al.*, 1994).

The construct validity of the AASE has also been assessed (DiClemente *et al.*, 1994). The AASE has been shown to correlate with other measures of self efficacy such as the Controlled Drinking Self-Efficacy Scale (Sitharthan *et al.*, 2003), suggesting strong construct validity.

#### **2.5.7 Quality of life**

Quality of life was measured using the Alcohol Related Problems Questionnaire (ARPQ) (Patience *et al.*, 1997). The ARPQ measures the impact of alcohol consumption on patients' lives with respect to quality of life. The quality of life construct within the ARPQ comprises measures of health problems, work problems, financial problems, family or relationship problems and legal problems. The ARPQ consists of eleven questions, each with two response modes (absent or present).

## Psychometric Properties of the ARPQ

No data exists regarding the psychometric properties of the ARPQ as this measure is relatively new. There are no other measures of Quality of life designed specifically for alcohol dependent populations, however it may have been useful to include a standardised measure for comparison, such as EQ-5D (EuroQoL Group, 1990).

### **2.5.8 Liver functioning**

Liver function was measured using levels of Gamma-glutamyl transferase (GGT). GGT is an enzyme that is produced in the liver, and is commonly used as a marker of liver dysfunction. Abnormal liver functioning is defined by a GGT level greater than 40 (O'Mahony, 2005). GGT levels were measured routinely within the inpatient unit where the study took place and data was readily available from participants' case files.

## **2.6 Ethics**

One of the main ethical issues facing the study was the potential uncovering of any difficulties or impairments experienced by participants, such as clinically significant levels of depressive symptoms via scores on the HADS. This issue was approached by advising the responsible medical officer of any difficulties uncovered, in line with routine clinical practice, and noting this within their clinical notes.

Other ethical issues which were considered in the design of this study included that participants could potentially believe that their health care would be affected if they didn't take part. To reduce the potential for such misunderstandings, efforts were made to clarify to participants that their health care would not be affected regardless of their decision whether or not to participate. These included highlighting the information sheet and discussing any concerns with the participants prior to the study.

Appropriate permissions had been gained to access and record demographic details and tests of liver function from these case files. To ensure confidentiality, several steps were taken such as; limiting access to information, storing information on password protected computers within locked properties, names of participants being kept separately from main files. This process is detailed further within the Patient information leaflet displayed in appendix two.

During the follow up stage of the study, if participants reported that they were drinking alcohol in a hazardous manner, the investigator advised them of the dangers of drinking in this manner and offered contact details for the Alcohol Problem Service. The main investigator has worked within this field for five years and holds specialist clinical skills relevant to such situations.

The protocol for this study was approved by the Lothian Research Ethics Committee and the Lothian Primary Care NHS Trust (Appendix one).

## 2.7 Data analysis

The Statistical Package for the Social Sciences (SPSS) version 12.0 was used for all analysis. Pearsons correlations were used to explore the relationships between relapse and each of the predictor variables in the respective hypotheses one to five (i.e. Memory and executive functioning, mood, self efficacy, quality of life, and liver function).

A number of studies report effect sizes in the relationship between relapse and the predictor variables of the current study. These were examined to determine what effect size exists in the population, and then used to estimate the number of participants required in the current study to find the same effect and be adequately powered at 0.8.

A number of criteria were set from which studies could be considered. These included a minimum sample size of 50; those that focused on relapse in alcohol dependence; and those that used specific diagnostic criteria for alcohol dependence. These studies are displayed in Table 2.

Table 2: Effect sizes reported in the literature

Area	Range of effect sizes ( $f^2$ )	Mean effect size ( $f^2$ )
Executive functioning and memory	0.10 – 0.16	0.13 (Bates <i>et al.</i> , 2006; Giancola, 2007; Scheurich <i>et al.</i> , 2004).
Mood	0.15 - 0.30	0.23 (Kushner <i>et al.</i> , 2005; Lynskey, 1998)
Self efficacy	0.10 – 0.11	0.15 (Bates <i>et al.</i> , 2006; Blomqvist <i>et al.</i> , 2003).
Quality of life	0.15 - 0.26	0.21 (Gunther <i>et al.</i> , 2005; Senbanjo <i>et al.</i> , 2006)
Liver function	0.10 - 0.26	0.13 (O'Mahony, 2005; Richardson <i>et al.</i> , 2001)

In order to calculate the sample size needed for the study, a sample size calculator was used (Soper, 2008). This was based on the sample size equations of Cohen (Cohen *et al.*, 2003). The parameters set within the calculation were power of 0.8, a significance level of 0.05, and an effect size of 0.17. The effect size was calculated as being the mean effect of the aforementioned studies. Based on Cohen's Power Tables (Cohen *et al.*, 2003) effect sizes ( $f^2$ ) of 0.02, 0.15, and 0.35 are considered small, medium, and large, respectively. A sample size of 68 was required to meet statistical power. Due to recruitment difficulties and time constraints only 54 subjects were

included in the study. This left the study under-powered, which is considered further in the discussion section.

## **3. Results**

### **3.1. Demographics**

A total of 54 participants took part in the study between October 2006 and November 2007. Of the 54 participants, 32 (59%) were male and 22 (41%) were female. The age range of participants was between 29 years old and 67 years old, with a mean age of 47.28 years (standard deviation 10.03).

### **3.2. Period of testing**

Participants were tested an average of 7.85 days (standard deviation 1.12) following cessation of drinking, with a minimum of six days and maximum of eleven days.

### **3.3. Participants**

Over the course of testing between October 2006 and November 2007, a total of 416 patients resided in the treatment unit where participants were selected, with 54 (13%) taking part in the study. Although most of the patients within the treatment unit met the inclusion criterion for the study, some participants had left the unit after initially being approached by the main investigator when they had entered the unit. This meant they were not able to take part in the study.

Of the 54 participants, two (4%) were unable to be followed up. A protocol for following up participants is detailed within the methods section, which was followed with both participants. No contact details could be found for either participant following contact with their respective General Practitioner.

### 3.4. Rates of relapse

The main outcome measure of number of days drinking in the three-month period following discharge from the detoxification unit, as measured by the number of days drinking (TLFB) is displayed in Table 3.1. Participants reported an average of 28.23 days drinking in the three-month period following discharge from the treatment unit. Seven participants (13% of sample) reported that they had not drunk at all in this period.

Table 3.1 Number of days drinking (TLFB score) at three month follow-up

N	Mean TLFB score	Standard Deviation	Minimum	Maximum
52	28.23	26.31	0	82

### 3.5. Measure of alcohol dependence

The SADQ was used to assess severity of alcohol dependence. Participant scores on this measure are displayed in Table 3.2.

Table 3.2. Severity of Alcohol Dependence (SADQ) scores at treatment exit

N	Mean SADQ score	Standard Deviation	Minimum	Maximum
54	43.6	8.1	24	51

This indicates the average score on the SADQ fell in the severe range of dependence.

The sample fell into the following severity ranges; mild (0 to 16) (N=0), moderate alcohol dependence (16 to 30) (N=15), and severe alcohol dependence (31-60) (N=38).

### 3.6. Test of normality of data

In order to test the assumption of normality, data were visually inspected using data plots and Kolmogorov-Smirnov tests were used as displayed in Table 3.3 overleaf.

Table 3.3 Kolmogorov-Smirnov tests of normality

Variable	Kolmogorov-Smirnov Z score	Significance
ARPQ (Quality of Life)	0.88	0.42
Rey Complex Figure (Copy)	0.94	0.35
Rey Complex Figure (Recall)	0.72	0.69
RAVLT (Recall and Recognition)	0.89	0.40
COWAT (Verbal Fluency)	0.68	0.74
Trail Making Test B	0.96	0.32
Letter Number Sequencing	0.73	0.82
HADS Total Score	0.47	0.98
AASE (Self-efficacy)	0.86	0.46
TLFB (Number of Days drinking)	1.24	0.09
SADQ (Severity Measure)	0.82	0.59

The results of these analyses suggest that all of the responses were normally distributed. The TLFB was close to being an abnormal distribution, and the use of this measure is explored further within the discussion chapter.

### 3.7. Hypothesis one: Deficits in memory and executive functioning at treatment exit will be associated with relapse at three months follow-up

In order to test the hypothesis that deficits in memory and executive functioning at treatment exit will be associated with relapse at three months follow-up, Pearson correlations were conducted between the cognitive measures and the main measure of relapse, the number of days drinking (TLFB score).

Table 3.4 Correlation analyses between cognitive measures and number of days drinking (TLFB score)

Cognitive measure	Pearson correlation	Significance level	N
Rey Complex Figure Test (Copy)	-0.12	0.45	40
Rey Complex Figure Test (Recall)	- 0.32	0.06	35
RAVLT Recall	-0.39	<0.01	47
Letter Number Sequencing (LNS)	-0.29	0.05 <sup>2</sup>	34
COWAT	-0.32	0.06	38
Trail Making Test B	0.40	0.01	45

<sup>2</sup> The LNS significance level of 0.05 was disregarded due to a more stringent significance level of 0.01 being adopted.

The RAVLT Recall and the Trail Making Test B were significantly correlated with the number of days drinking (TLFB score) in the three month period following treatment.

### **3.8. Hypothesis two: Low mood at treatment exit will be associated with relapse at three months follow-up**

Of the 54 participants, 45 (70%) completed the HADS. The mean score on the HADS was 25.31 (std. deviation = 9.97), with scores of 14.25 (std. deviation = 5.46) and 10.95 (std. deviation = 6.04) for the Anxiety and Depression subscales respectively. The number of participants who fell within the ranges of the HADS were; normal (0-14) (N=8); mild (15-20) (N=4); moderate (21-29) (N=16); and severe (30-42) (N=17).

In order to test the hypothesis that low mood at treatment exit will be associated with relapse at three months follow-up a Pearson correlation analysis was used. This showed that HADS scores were significantly linked to number of days drinking (TLFB score) ( $p < 0.01$ ). With regards to subscales, HADS Depression was significantly correlated ( $p < 0.01$ ) to number of days drinking whereas HADS Anxiety was not ( $p = 0.13$ ). These results are displayed in Table 3.5 overleaf.

Table 3.5 Correlation between the HADS and number of days drinking (TLFB score)

	Pearson correlation	Significance level	N
Overall HADS score	0.50	<0.01	45
Anxiety subscale (HADS Anxiety)	0.24	0.13	45
Depression subscale (HADS Depression)	0.62	<0.01	45

### **3.9. Hypothesis three: Low self-efficacy at treatment exit will be associated with relapse at three months follow-up**

In order to test whether low self-efficacy was associated to relapse, a Pearson correlation analysis was used. This showed there was no significant relationship ( $r = 0.26$ ,  $n = 52$ ,  $p = 0.09$ ) between the AASE and number of days drinking (TLFB score). Consequently hypothesis three was not supported.

### **3.10. Hypothesis four: Low quality of life at treatment exit will be associated with relapse at three months follow-up**

In order to test the hypothesis that low quality of life at treatment exit is associated with relapse at three months, a Pearson correlation was conducted between the measure of quality of life (ARPQ) and the measure of relapse (number of days drinking, TLFB score). This showed no significant relationship ( $r = 0.09$ ,  $n = 52$ ,  $p = 0.55$ ). Thus hypothesis four was not supported.

### **3.11 Hypothesis five: Liver dysfunction at treatment exit will be associated with relapse at three months follow-up**

In order to test the hypothesis that liver dysfunction at treatment exit is associated with relapse at three months, a Pearson correlation analysis was used. This showed no significant relationship ( $r = 0.30$ ,  $n = 37$ ,  $p = 0.07$ ) between liver function and number of days drinking (TLFB score). The sample size for this analysis was somewhat smaller as liver function data was only available for 37 participants.

### 3.12 Further analysis

#### 3.12.1 Regression analysis

In order to explore the significant correlations between the measures administered and the number of days drinking (TLFB score), a regression analysis was used. The three variables with the most significant correlations with TLFB scores were entered simultaneously into a linear regression model, using the enter method (Table 3.6). The variables entered were the RAVLT Recall, the Trail Making Test B, and the HADS Depression.

Table 3.6 Regression analysis of number of days drinking (TLFB score) on the RAVLT Recall, the Trail Making Test B, and the HADS Depression.

R	R Squared	Adjusted R Squared	Std. error of the estimate
0.59	0.35	0.28	22.90

	Sum of Squares	Degrees of freedom	Mean Square	F	Significance
Regression	8108.99	3	2702.99	5.15	<0.01
Residual	15220.89	29	524.86		
Total	23329.88	32			

	Beta (Unstandardised) <sup>3</sup>	Std. Error	T	Significance
Constant <sup>4</sup>	23.57	21.05	1.12	0.27
Trail Making Test B	0.05	0.06	0.81	0.42
HADS Depression	1.19	0.41	2.88	<0.01
RAVLT Recall	-0.59	0.36	-1.68	0.10

The Adjusted R Squared value indicates that twenty eight per cent of the variance in the number of days drinking (TLFB score) can be predicted by the independent variables (RAVLT Recall, the Trail Making Test B, and the HADS Depression). The Adjusted R squared value was used as this adjusts the balance between sample size and the number of predictor variables.

The regression analysis was significant ( $F(3, 32) = 5.15, p < 0.01$ ) indicating that the independent variables (RAVLT Recall, the Trail Making Test B, and the HADS Depression) reliably predict the number of days drinking (TLFB score).

The Regression analysis showed that only the HADS Depression was a significant factor in the regression equation ( $B = 1.19, p < 0.01$ ). As there are two non-significant factors in the regression equation, a further analysis was completed without the least significant factor, namely the Trail Making Test B. This is displayed in Table 3.7.

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<sup>3</sup> Beta is the size of the effect on number of days drinking. The unstandardised beta was used as this makes a prediction with the values of the independent variables. This is preferable to standardised beta which uses the strength of the independent variables, in a similar manner to a correlation coefficient.

<sup>4</sup> The constant refers to the predicted value when all other variables are 0. This is also known as the height of the regression line when it crosses the Y axis (i.e. Y intercept)

Table 3.7 Regression analysis of number of days drinking (TLFB score) on RAVLT Recall and the HADS Depression.

R	R Squared	Adjusted R Squared	Std. error of the estimate
0.69	0.48	0.45	19.44

	Sum of Squares	Degrees of freedom	Mean Square	F	Significance
Regression	11973.73	2	5986.86	15.84	<0.01
Residual	13225.33	35	377.87		
Total	25199.05	37			

	Beta (Unstandardised)	Std. Error	T	Significance
Constant	13.77	12.09	1.14	0.27
HADS Depression	2.73	0.56	4.85	<0.01
RAVLT Recall	-0.32	0.24	-1.26	0.22

The regression analysis was significant ( $F(2, 37) = 15.84, p < 0.01$ ) and indicated that of the independent variables, only the HADS Depression was a significant factor in the regression equation ( $B = 2.73, p < 0.01$ ).

There was no evidence of multi-collinearity (i.e. where two or more predictor variables in a multiple regression model are highly correlated). In a case of multi-

collinearity large changes are observed in the estimated regression coefficients when a predictor variable is deleted from the regression model (Kuter, *et al.*, 2004), which did not occur here when the Trail Making Test B was removed. In addition to this, a variance inflation factor analysis (VIF) was used to detect further evidence of multi-collinearity. This is an index which measures how much the variance of a coefficient increases because of collinearity.

$$\text{VIF} = 1 / (1 - R \text{ squared}) = 1 / (1 - 0.45) = 1.82.$$

This indicated that there was no evidence of multi-collinearity as the  $\text{VIF} < 5$  (Kuter *et al.*, 2004).

### 3.12.2 Effect of gender on test scores

A t-test was used to examine any differences between males and females on the tests administered. As shown in Table 3.8, there were no statistically significant differences between males and females on any of the measures administered. Thirty two (59%) of the sample were male and 22 (41%) were female. The sample distribution within the current study was abnormal when compared to other alcohol dependence samples. In particular there was a greater proportion of females within the current study (E.g. Kranzler, *et al.*, 1996: Twenty six per cent female; Schafer *et al.*, 1991: Thirty three per cent female.)

Table 3.8 Mean Test scores for Males and Females

	Male		Female		Significance level	T
	Mean Score	Standard Deviation	Mean Score	Standard Deviation		
Rey Complex Figure Test (Copy)	20.61	10.56	22.71	8.67	0.51	0.67
Rey Complex Figure Test (Recall)	10.32	8.23	9.72	5.98	0.81	0.24
RAVLT Recall	31.07	11.75	38.84	16.01	0.06	1.92

	Male		Female		Significance level	T
	Mean Score	Standard Deviation	Mean Score	Standard Deviation		
RAVLT Recognition	9.42	3.54	9.93	5.19	0.71	0.37
COWAT	18.05	9.69	18.81	6.56	0.79	0.27
Trail Making Test B	241.68	130.95	222.85	120.34	0.62	0.49
LNS	6.40	2.68	7.95	3.10	0.08	1.77
GGT (Liver Function Test)	544.57	531.58	573.81	660.59	0.88	0.15
HADS Total	25.12	10.97	25.58	8.70	0.88	0.15
HADS Anxiety	13.96	5.99	14.67	4.73	0.68	0.42
HADS Depression	11.15	6.53	10.67	5.40	0.80	0.26
AASE	54.00	24.63	58.89	26.80	0.53	0.64
TLFB	32.48	26.73	22.23	25.06	0.16	1.41
ARPQ	15.94	2.50	16.14	2.41	0.77	0.30
SADQ	45.61	7.83	39.40	8.72	0.52	0.46

### 3.12.3 Effect of Age on test scores

Pearson correlations were used to examine effects of age on the tests administered. As can be seen in Table 3.9, there were no statistically significant effects of age on any of the measures administered. The age range of participants was between 29 years old and 67 years old, with a mean age of 47.28 years (standard deviation 10.03).

Table 3.9 Pearson correlations between Age and Test scores

	Pearson Correlation	N	Significance level
Rey Complex Figure Test (Copy)	-0.17	40	0.30
Rey Complex Figure Test (Recall)	-0.15	35	0.38
RAVLT Recall	0.05	47	0.74
RAVLT Recognition	0.17	37	0.30
COWAT	0.14	38	0.39
Trail Making Test B	-0.02	45	0.91
LNS	0.13	34	0.39
GGT (Liver Function Test)	-0.19	37	0.28
HADS Total Score	-0.21	45	0.23
HADS Anxiety	-0.18	45	0.29

	Pearson Correlation	N	Significance level
HADS Depression	-0.19	45	0.29
AASE (Self-efficacy)	-0.22	54	0.19
TLFB (Days Drinking)	-0.16	52	0.24
ARPQ (Quality of Life)	-0.18	54	0.29
SADQ (Severity Measure)	0.15	54	0.38

### 3.12.3 Mean scores

Table 3.10 contains mean scores and normative scores for all measures that are not previously reported within the thesis. These are discussed further within the discussion chapter in section 4.3.

Table 3.10 Mean scores and normative scores for measures administered

Measure	Sample Mean	Standard Deviation	Normative mean	Alcohol dependence mean
Rey Complex Figure Test (Copy)	21.50	9.73	32.35 <sup>1</sup>	n/a
Rey Complex Figure Test (Recall)	10.04	7.19	22.80 <sup>3</sup>	18.01 <sup>2</sup>
RAVLT Recall	34.21	14.01	60.65 <sup>4</sup>	n/a
LNS	7.07	2.94	10.00 <sup>5</sup>	6.60 <sup>6</sup>
COWAT	18.37	8.42	71.94 <sup>8</sup>	34.78 <sup>7</sup>
Trail Making Test B	233.30	125.28	31.00	79.00
ARPQ (Quality of Life)	16.02	2.45	n/a	14.20

<sup>1,2,4</sup> (Spreen & Strauss, 1998); <sup>3</sup> (Dawson & Grant, 2000); <sup>5</sup> (Wechsler, 1997a); <sup>6</sup> (Lysaker *et al.*, 2002); <sup>7</sup> (Loonstra *et al.*, 2001); <sup>8</sup> (Blume, *et al.*, 2005); <sup>9,10</sup> (Horton & Roberts, 2001);

## **4. Discussion**

### **4.1 Aim of research**

The broad aim of the study was to identify factors that increase the likelihood of relapse within alcohol dependent subjects. The sample group of the study were those who were at the severe end of the range of alcohol dependence, with levels of alcohol consumption that had resulted in a number of serious physical, psychological and social consequences.

The factors considered as potential predictors of relapse were memory and executive functioning, mood, self-efficacy, quality of life, and liver function. These factors were selected as from a clinical perspective as they appear important and yet had been largely neglected within past research for this group.

### **4.2 Discussion of main findings**

#### **4.2.1 Low mood and relapse**

The main finding of the current study was that low mood was strongly associated with relapse. Score on the HADS was correlated with the number of days drinking (TLFB score). This finding was given further weight by a regression analysis where

the HADS Depression sub-scale was the only significant factor.

These findings would suggest that a high score on the HADS Depression is linked to relapse in alcohol dependence, thus supporting hypothesis two. Within the literature low mood has been strongly linked with relapse in alcohol dependence (Greenfield *et al.*, 1998).

A common finding within the literature is that alcohol dependence and affective disorders often present together, and are termed as ‘co-morbid’ (Davidson & Ritson, 1993). This would appear to be the case from a clinical level within the treatment unit setting of the current study, as many individuals fit the criterion for clinical depression in addition to a having a diagnosis of alcohol dependence. It is possible that the presence of depression may impede cessation of drinking within individuals with a primary diagnosis of alcohol dependence. Thus, low mood or depression may develop through alcohol misuse. Concurrently, individuals who are initially depressed may develop alcohol dependence through a pattern of harmful drinking and it may be that their alcohol consumption is a form of self medication (Carrigan & Randall, 2003).

The variety of possible explanations of co-morbidity accounts for some of the difficulty in making progress towards general conclusions regarding the effect of low mood on relapse. It is possible that alcohol dependence is directly a cause of co-morbidity. For example alcoholic hallucinosis, and stress resulting from alcohol dependence may lead to associated low mood. Presence of dysphoria and alcoholic

delirium during and following alcohol withdrawal may explain increased prevalence of psychiatric difficulties, such as experiencing low mood following a period of withdrawal. In addition to these explanations, it is possible that alcohol dependence may expose a predisposition to a mental illness or psychological state that would not otherwise have been manifest, or that mental illness is a precipitant of alcohol misuse (Chutuape & De Wit, 1995) as discussed within the introduction chapter.

The findings of this study suggest that alcohol misuse and dependence may exacerbate psychiatric symptomatology, and increase the likelihood of relapse. It is possible that increased alcohol misuse may lead to poor compliance with mental illness treatment, which could explain the increased relapse rates for this group within the current study. Poor engagement with psychiatric service is strongly associated to relapse in alcohol dependence as has been shown throughout the literature in the nationwide ECA and COSMIC studies (Regier *et al.*, 1990; Department of Health, 2004).

The apparent absence of an association between anxiety at treatment exit and drinking days during the following three months is not consistent with previous findings. There is strong evidence that anxiety is linked to alcohol dependence and relapse (Allan, 1995; Brady & Lydiard, 1993; Cox *et al.*, 1990). Within the current study, it may be that such anxiety is lowered in the protected environment of the inpatient programme and is more apparent after discharge. Thus, it may be that any apparent anxiety disorders would not have been detected at this point.

It is possible that the measurement of mood using a state measure such as the HADS may have influenced the findings of the current study. This is discussed later within this chapter in section 4.5.

#### **4.2.2 Cognitive functioning and relapse**

Two cognitive measures, namely the Trail Making Test B, and the RAVLT Recall were correlated with number of days drinking at three months. However, neither of these associations are significant when low mood was controlled for in the regression analysis. This would suggest there may be an association between poor memory, executive functioning, and relapse but with no evidence of a direct link. This finding contradicts much of the established literature that links deficits in cognitive functioning with relapse in alcohol dependence (McIntosh & Chick, 2006; Rourke & Loberg, 1996). This would suggest that cognitive functioning is a less important factor with regards to relapse. However, it is possible that the results of the current study may have been influenced by the period where cognitive testing took place, as commented on further in section 4.5.2.3.

The Trail Making Test B was correlated to the number of days drinking. This test measures set-switching and executive functioning (Noel *et al.* 2001) and suggests that deficits in these cognitive areas are linked to relapse. However, neither the COWAT nor the LNS, which are also measures of executive function, was significantly correlated with the number of days drinking. There was a low response rate to both of these tests, and during testing participants often commented that they

found them difficult to understand. Thus, it is possible that the exceptionally poor scores observed on the COWAT and the LNS may reflect difficulties in understanding the requirements of the task, rather than necessarily reflecting deficits in the specific cognitive constructs measured by the task, which may explain the lack of association with relapse. Poor performance on the Trail Making Test B suggests that deficits in executive function are linked with increased relapse. For example, a deficit in executive function could lead to presentation of disinhibited behaviour. In turn, this could lead to relapse from a failure to restrain behaviour that leads to consuming alcohol.

A further negative association was noted between relapse and performance on the RAVLT, which measures short-term verbal memory (Lezak, 1995). This link suggests that deficits in short term verbal memory are related to increased vulnerability of relapse, meaning an individual with poor short term verbal memory may find it difficult to maintain sobriety. For example, a short term memory problem could increase the likelihood of forgetting the dates of treatment sessions, and consequently lower attendance rates, which in turn could increase relapse proneness (Brown *et al.*, 2003).

#### **4.2.3 Self-efficacy and relapse**

The AASE was not correlated with relapse in the current study. This is was contradictory based on predictions based on previous research given the wealth of literature regarding the relationship between self efficacy and alcohol dependence

(Demmel & Beck, 2004; Long *et al.*, 2000; Vielva & Iraurgi, 2001). Possible reasons for the poor link between self-efficacy and alcohol dependence could centre on the choice of the AASE as a measure of self-efficacy, as discussed later in this chapter in section 4.5.3.

#### **4.2.4 Quality of life and relapse**

No relationship was found between quality of life and relapse within the current study. The ARPQ was used as the measure of quality of life, which is a new measure that has only been used in a small number of studies (e.g. Kritze-Topor *et al.*, 2004). It is possible that this measure may not have been a sufficiently sensitive or appropriate measure of quality of life. This suggestion is given weight by that fact that low mood and cognitive impairment were linked to relapse in the current study, which both appear to be contributing factors to the concept of quality of life.

#### **4.2.5 Liver Function and Relapse**

The findings of this study suggested there is no link between liver function and relapse in alcohol dependence. Within the literature there is much debate over whether poor liver function is linked to relapse in alcohol dependence (Klopocka *et al.*, 2007; Limin *et al.*, 1999). Although not significant, there was a medium effect size for the relationship (Cohen 1992) and the sample size of participants who had their liver function measured was only 37. Consequently it is possible that there is an association between liver function and relapse, but that the current study was

insufficiently powered to detect this statistically.

The period during which liver function measures were taken may have contributed to absence of an association between liver dysfunction and relapse. Previous studies that tested liver function during the first three weeks of abstinence have demonstrated a weak relationship between impairments in liver function and relapse (O'Mahony, 2005; Walton & Bowden, 1997). Improvement in functioning has been shown to improve rapidly through the first six weeks following cessation of drinking (Mann *et al.*, 1999), thus it is possible that liver function may have been tested in the current study at a premature stage.

#### **4.3 Scores and comparisons with normal scores.**

In general, scores on the measures administered were well below the normative range, as would be expected in alcohol dependence (see Table 3.10). A number of mean scores were below the range expected for alcohol dependence populations, indicating even more deficient performance. This probably reflects the greater severity of alcohol dependence in the current study's sample relative to other studies of alcohol dependence. However, poor performance on a number of tests may also be explained by other factors within testing.

Scores on the Rey Complex Figure Test, and COWAT were significantly below the normative range for alcohol dependence (Meyers & Volbrecht, 1999; Silverstein *et al.*, 1998). Many participants stated they found it difficult to understand these tests

and non-completion of measures may have been due to a fear over potential poor performance.

The Trail Making Test B was completed with a mean completion time substantially greater than the reported range for alcohol dependence (Horton & Roberts, 2001; Tombaugh, 2004). It is possible that performance may have been influenced by the test order and the omission of Part A of the Trail Making Test, as undertaking Trails A may help orientate participants to the task and thus facilitate Trails B. The normative data used to compare this sample with included Part A in their test procedure, which may explain the apparent poor performance of participants within the current study.

#### **4.4 Implications for clinical practice**

The main finding of the study suggests that low mood predicts relapse in alcohol dependence during the three months following a period of in-patient detoxification. Given the prevalence of co-morbidity between alcohol dependence and affective disorders, it is possible that treatment outcomes for alcohol dependence may be modified by the existence of a co-existing affective disorder. That is, depressive symptomatology may act to reduce the efficacy of treatment for alcohol dependence. This has important implications for efficacy of treatment and cost-effectiveness as low mood may be reducing the impact of any treatment strategy for this group.

As low mood appears to be associated with increased likelihood of relapse, it may be helpful if strategies that focus on management of low mood and depression are incorporated within treatment. This could occur in residential detoxification and also during any follow up treatment, and include psychological based treatments for low mood which have been shown to be effective within this client group (Chick, 1999a; Edwards *et al.*, 2003; Witkiewitz & Marlatt, 2007).

Given the prevalence of low mood and alcohol dependence found within the current study, and throughout the literature (Hasin *et al.*, 2002), indicates a need for services to meet the needs of this group. The findings of this study would suggest there is a need to deliver integrated services for both alcohol misuse and mental illness (Raistrick *et al.*, 2006). There is a strong theoretical argument to integrate the psychosocial element of treatment for both alcohol misuse and mental illness. For example, Graham and colleagues demonstrate how thoughts and behaviours related to alcohol misuse can become intertwined with mental illness symptoms. This implies that an integrated approach is necessary for treatment service for this group (Graham *et al.*, 2003)

In addition to the implication of increasing treatment service for low mood, these findings also suggest there may be an implication for improving staff training in these areas. For example, it may be helpful for staff to be supported to increase their knowledge of low mood and depression, which would presumably improve treatment services.

Although the results for memory and executive functioning were mixed, there was evidence of association between some measures and relapse. Poor performance on the Trail Making Test B, and the RAVLT Recall would suggest that impairment in memory and executive dysfunction can detrimentally affect an individual's ability to remain abstinent from alcohol. This is not surprising given the evidence within the literature that links poor memory and executive functioning with relapse (Rourke & Loberg, 1996). There are a number of potential implications for clinical practice that can be taken from this finding. It has been suggested that cognitive functioning can take between three and six weeks to fully recover following a period of increased alcohol consumption (Ryan & Butters, 1986). Given that performance on the cognitive measures administered here was poor for most participants during weeks one and two, suggesting that individuals could still have a considerable amount of recovery to undergo following their testing at around ten days after cessation of drinking. It may be beneficial for these individuals to be kept in a treatment setting until their level of function is more fully recovered. This could afford an opportunity for them to engage with interventions aimed at improving mood as commented on earlier in this chapter, although presumably any lowered cognitive state may influence their ability to engage. Further to this, it also questions the effectiveness of any interventions when patients are at this low level of cognitive functioning. It may be helpful if cognitive rehabilitation strategies are incorporated within the in-patient detoxification treatment setting, and also during any follow up treatment. One could hypothesise that deficiencies in cognitive functioning may lead to increased risk of relapse as an individual may not be able to apply any of the skills they have learned during treatment as a result of their cognitive deficits. It is also possible that impaired

problem solving ability (as indicated by executive dysfunction) increases the potential for anxiety in situations beyond the detoxification unit, which in turn increases the risk of relapse, as suggested by Sayette (1993).

## **4.5 Methodological issues**

### **4.5.1 Self report measures**

The use of the TLFB as a measure of relapse may have influenced the results of this study as this measure is reliant on self-report and the honesty of respondents. The TLFB has been used as a main outcome variable for alcohol research since its conception in 1979. It has been extensively evaluated in a variety of settings, and has been found to have good measurement properties (Sobell & Sobell, 1992; Sobell *et al.*, 1994). Moreover, the TLFB has been shown to be correlated with external measures of alcohol dependence, such as alcohol-related incidents, and liver functioning (Addiction Research Foundation, 1998), indicating strong external reliability for the measure (Sobell *et al.*, 1979b).

The TLFB was administered over the telephone in the current study and one might question whether participants were accurately reporting their level of drinking when asked over the telephone. However telephone administration of TLFB has been shown to be reliable within a number of studies where it has been linked to reports of

drinking behaviour provided by significant others, which would indicate it is a valid measure of relapse (Connors *et al.*, 1992; Litt *et al.*, 1992; Sobell *et al.*, 1996).

Alcohol consumption around the time of report may have affected the responses given by participants. Self-reports of recent drinking have been shown to be invalid and underreported if the individual has been drinking around the time of the assessment (Sobell *et al.*, 1979c). That is, if participants were drinking around the time of response, which a large proportion of the sample of the current study were, they would be less likely to give an accurate account and may have underreported any alcohol consumption.

Within the current study reported drinking was followed for ninety days following detoxification from alcohol, in line with Connors *et al.* (1992). However, it is possible that subjects in this study may have found it more difficult to remember periods of drinking for the longer period of 90 days given the somewhat lengthy time period and cognitive difficulties apparent in the sample. This places the current study at a significant disadvantage when compared with others such as Sobell *et al.* (1996) who examined drinking behaviour for a lesser period of 30 days.

In order to reduce the aforementioned difficulties, the current study used memory aids such as a daily calendar, provided within the Timeline Followback. Moreover, as suggested by Sobell *et al.* (1979c), key personal dates such as appointments with health professionals and personal information such as birthdays were also used. These are referred to as anchor points (Sobell *et al.*, 1979c.) A number of other

methods were also used to improve the efficacy of responses including; black and white days (periods of abstinence and binging), and the exaggeration technique (presenting to the interviewee the possibility of greater amounts than he is likely to have consumed in order to encourage honest report) (Sobell *et al.*, 1996).

#### **4.5.2 Potential Confounding variables**

##### *4.5.2.1 Mood and alcohol withdrawal*

The HADS was chosen for this study as it places less emphasis on the physical effects of mood. It is possible that at the time of testing, participants in this study may have been experiencing similar effects to the physical symptoms of low mood as a result of alcohol withdrawal (e.g. poor concentration). This may have resulted in an elevated score on the HADS that was due to symptoms of alcohol withdrawal as opposed to low mood. Although the choice of this measure was a valid attempt to control for these factors, the influence of physical health and alcohol withdrawal may still have affected test performance. Due to the similarities between symptoms of alcohol withdrawal and depression, measures of mood which rely upon somatic items can overestimate presence of depression. The HADS was used in the current study as it was developed to reduce reliance on somatic items in order to attempt to control for such effects. Additionally, sub clinical low mood may influence risk of relapse and a continuous scale may be more predictive than a present or absent diagnosis (Sellman & Joyce, 1996).

#### 4.5.2.2 Measure of mood

Measurement of mood using state measures as opposed to a clinical diagnosis may also limit the findings of the study. Several studies within the literature have used a clinical diagnosis, such as DSM-IV based criterion (Greater Glasgow Health Board, 2000).

Although there is strong evidence in the current study and throughout the literature of a link between low mood and alcohol dependence, some studies have found low rates of mood disorder within this group (Poole & Brabbins, 1996). The use of diagnostic interview to determine psychiatric co-morbidity lies in contrast to the current study, which employed the HADS, a screening tool for anxiety and depression. The most common criterion used to identify mood difficulties are: a measure of mood state, such as the HADS, based on presence of symptoms; a current diagnosis of mood disorder derived from a structured interview relating to psychiatric criterion; or a lifetime diagnosis of clinical depression. These different methodologies may have an influence on levels of co-morbidity reported within the literature. Sellman and Joyce (1996) found a 25 per cent rate of co-morbidity within a male sample using a lifetime diagnosis of major depression as diagnostic criterion. This methodology was also used by a number of other studies that found a variety of rates of clinical depression in alcohol dependence; Penick *et al.* (1988) 26 per cent co-morbidity; Grant *et al.* (1989) 67 per cent co-morbidity; Kranzler *et al.* (1996) 38 per cent co-morbidity.

In using diagnostic criterion to determine co-morbidity, this implies that a diagnosis

of primary major depression may have to be present. More specifically if one adheres to the criterion of ICD-10, any symptoms of depression must not be due to a substance (World Health Organisation, 1992). This makes a distinction with substance induced disorder where clinically significant symptoms co-occur with substance use but exceed effects of intoxication or withdrawal. Thus, the use of diagnostic criterion to identify depression means that any incidences of low mood due to substance misuse may be missed. This would appear to exclude a large sample of the population who are alcohol dependent and have a secondary diagnosis of depression.

The use of a lifetime diagnosis of psychiatric disorder may also have a confounding effect on co-morbidity rates. Although lifetime disorders would appear to be stable and persistent, at any one time an individual may not be suffering from the effects of low mood. This could be due to good management of their disorder or that they are not experiencing a relapse at this point in time. However, these individuals may still be categorised as having a mood disorder within any of the research papers applying this methodology, despite the fact they may not be suffering from low mood at that particular time.

Symptoms of anxiety and depression are very common amongst individuals entering alcohol treatment programmes, with as many as 80 per cent experiencing clinically significant symptoms (Raistrick *et al.*, 2006). This is reflected within the high prevalence of depressive symptoms found within the current study. It has been established that psychiatric symptoms, such as low mood, rapidly subside as alcohol

misuse is controlled, and after one or two weeks of abstinence, a person believed to have a mental illness may become symptom-free (Raistrick *et al.*, 2006). This has important implications in terms of methodology when estimating prevalence rates of psychiatric co-morbidity, as discussed previously. It may be that use of a stable diagnosis is the best manner in which to categorise psychiatric difficulties, given that state measures may not reflect the true level of psychiatric morbidity. This would point towards a relative weakness of the current study, although it does not detract from the usefulness of measuring psychiatric symptomology at any particular time as frame of reference from which future relapse rates can be linked.

#### *4.5.2.3 Cognitive functioning*

By testing cognitive functioning within the first ten days following cessation of drinking, there is a risk that the individual's level of functioning may not have recovered to its maximum level (Ryan & Butters, 1986). When combined with the effects on cognitive functioning that detoxification from alcohol can present, such as confusion, it may be that participant performance on the cognitive measures here was not an accurate reflection of their real 'toxicant-free' level of cognitive functioning. It is possible that some of the lowered cognitive function within the sample may have reflected residual temporary effects of heavy alcohol consumption rather than permanent effects of alcohol dependence. Ultimately though, this factor was identified as a clinical indicator of relapse, thus from that perspective it mattered less whether it was temporary or permanent

#### *4.5.2.4 Other Factors that may predict Relapse*

There are other factors that were not accounted for within this study that may have contributed to rates of relapse. For example, prior drinking history or previous involvement with alcohol treatment services were not considered. Further to this, previous attendance within the treatment setting may also have influenced self efficacy, which in turn may have affected relapse. These factors could have had a large influence on drinking behaviour in this period.

The lack of consideration for medication within the study may have influenced results. Anti-depressant medication has been shown to improve depressive symptoms (Messiha, 1993; Gram, 1994), with some medications impairing cognitive functioning (Thase & Kupfer, 1996). This in turn may have affected the validity of the data collected within the study. A solution to this may have been to exclude participants who were receiving medication. However, given the large prevalence of medication use within the treatment setting, this would have resulted in many participants not taking part or the study not being ecologically valid.

#### **4.5.3 Measure of self efficacy**

It is a little surprising that no association between self-efficacy and relapse indicators was found in this study. Possible reasons for this could centre on the choice of the AASE (temptation sub-scale) as a measure of self-efficacy. The main reason to choose only the Temptation sub-scale was related to the pressure of time within the

test battery, and that it had used previously as an established measure (Monti *et al.*, 2002). Although the AASE is widely used within the literature (Bischof *et al.*, 2007; Piderman *et al.*, 2007; Witkiewitz 2007), using its sub-scales in isolation may have been a limiting factor.

#### **4.5.4 Measure of quality of life**

The use of the ARPQ as a measure of quality of life appeared to be a weakness of the current study. As this is a relatively new measure, there have been few other studies carried out from which to base any comparisons. Kritze-Topor *et al.* (2004) used the ARPQ in a sample of treatment seeking individuals with alcohol misuse who attended their General Practitioner. Although participants met the DSM-IV criterion for alcohol dependence, this group is likely to have been significantly more functional than the sample in the current study, which was hospital based. It would therefore appear understandable that the current sample group would have considerably lower scores on a measure of quality of life

Within the literature, quality of life has been linked with alcohol dependence (Foster *et al.*, 1999; Senbanjo *et al.*, 2006). However, there was no relationship found poor quality of life and relapse within the current study. The choice of using the ARPQ as measure of quality of life may have limited the findings of the current study, and on retrospect it would have been useful to have also included an established generic measure of quality of life. For example, the World Health Organisation Quality of life brief version (WHOQoL – BREF) (World Health Organisation, 1993), which has

previously been used by Passey *et al.*, (2007) with an alcohol dependent population. The ARPQ was primarily chosen as it currently being used within the alcohol service where the study took place.

#### **4.5.5 Non completion of measures**

There were some difficulties with non completion of the cognitive measures in the current study, namely the LNS and the COWAT. The reasons for participants' not completing these measures mainly centred on the perceived difficulty of the test. Participants often reported they did not feel comfortable completing the task stating they felt fatigued.

#### **4.5.6 Statistical Power**

A sample size of 68 was required to meet statistical power. However, only 54 subjects were recruited to the study, due to time constraints and a low participation rate. Only 54 (13%) from a total of 416 patients who resided in the treatment unit where participants were selected, took part in the study. This was partially due to participants leaving the treatment unit prior to taking part in testing. These restrictions left the study under-powered, which limits the implications of the findings

## 4.6 Implications for future research

Given that low mood was found to be an important factor in predicting relapse, the main implication for future research is linked to the potential effect that treatment for low mood and depression has within this group. In addition to this there are a number of other related areas that could be examined.

Patients with a higher degree of depressive symptoms can be integrated worse in treatments and concurrently have a poorer outcome (Allan, 1995). Future research may concentrate on evaluating whether individuals benefit from a more intensive treatment programme, aimed at increasing engagement and integration.

Another area of focus may be examining the impact of secondary psychiatric treatments on relapse to drinking. It is possible that symptoms of depression may develop into cues for relapse over time. For example, insomnia is one of the diagnostic criteria for depression and an increase in sleeping difficulties could directly lead to alcohol use as a coping mechanism. In turn, this association could develop such that relapse is triggered by future occurrences of this problem. This highlights the need for an evaluation of interventions focused on associated conditions within this setting.

Future research may also focus on monitoring changes in levels of cognitive functioning over the course of an initial period following cessation of drinking. This could have implications for treatment services, as if cognitive functioning is shown

to still be low but improving prior to treatment exit, this would add weight to the argument postulated earlier within section 4.4 for increasing the stay of patients within the treatment unit.

## **4.7 Conclusions**

Within this study a number of factors appeared to be associated with relapse in severe alcohol dependence. In particular, low mood was highly predictive of relapse. This highlights the need for interventions to reduce low mood and suggests longer rehabilitation of inpatient care, with the aim of reducing relapse rates in people receiving treatment for severe alcohol dependence in this largely neglected group.

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**Appendix one – Ethical Approval Documents**

## NHS Research Ethics Committee

### Application form

This form should be completed by the Chief Investigator, after reading the guidance notes. See glossary for clarification of different terms in the application form.

**Short title and version number:** (maximum 70 characters – this will be inserted as header on all forms)

Predictors of relapse in alcohol dependence

**Name of NHS Research Ethics Committee to which application for ethical review is being made:**

Lothian NHS Research Ethics Committee

**Project reference number from above REC:** 06/S1104/31

**Submission date:** 28/07/2006

#### PART A Introduction

##### A1. Title of the research

Full title: Predictors of relapse and outcome in alcohol dependence at three months following in-patient detoxification

Key words: Relapse, alcohol dependence

##### A2. Chief Investigator

Title: Mr  
 Forename/Initials: Fraser  
 Surname: Morrison  
 Post: Trainee Clinical Psychologist  
 Qualifications: M. A. (Hons.) Psychology  
 Organisation: NHS Lothian  
 Address: Department of Psychology  
 40 Colinton Road  
 Edinburgh  
 Post Code: EH10 5BT  
 E-mail: fraser\_morrison@hotmail.com  
 Telephone: 07789268245  
 Fax:

*A copy of a current CV (maximum 2 pages of A4) for the Chief Investigator must be submitted with the application*

##### A3. Proposed study dates and duration

Start date: 01/09/2006  
 End date: 01/02/2008  
 Duration: Years: 2 ; Months: 8

**A4. Primary purpose of the research:** *(Tick as appropriate)*

- Commercial product development and/or licensing
- Publicly funded trial or scientific investigation
- Educational qualification
- Establishing a database/data storage facility
- Other

**A6. Does this research require site-specific assessment (SSA)?** *(Advice can be found in the guidance notes on this topic.)*

Yes  No

*If No, please justify:*

The assessments used in the research are within the routine professional competence of local collaborators (e.g. mental health assessments)

*If Yes, Part C of the form will need to be completed for each research site and submitted for SSA to the relevant Local Research Ethics Committee. Do not submit Part Cs for other sites until the application has been booked for review and validated by the main Research Ethics Committee.*

*Management approval to proceed with the research will be required from the R&D Department for each NHS care organisation in which research procedures are undertaken. This applies whether or not the research is exempt from SSA.*

## Appendix two – Information Leaflets

## **Patient Information Sheet**

### **PREDICTORS OF RELAPSE AND OUTCOME IN ALCOHOL DEPENDENCE**

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. Talk to others about the study if you wish.

- Part 1 tells you the purpose of this study and what will happen to you if you take part.
- Part 2 gives you more detailed information about the conduct of the study.

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.

#### **Part 1**

##### **What is the purpose of the study?**

Often people who have an alcohol problem find it difficult to remain sober when they have stopped drinking. This can be due to a number of factors.

The aim of this study is to find out which factors influence if a person with an alcohol problem relapses into their previous drinking behaviour.

This study is being carried out to fulfil the requirements of the Doctoral in Clinical Psychology training of the main investigator, Fraser Morrison.

##### **Why have I been chosen?**

All patients within the Alcohol Problems Clinic are being asked to take part in this study. The reason for this is that patients within this clinic have difficulties with alcohol.

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

It is up to you to decide whether or not to take part. If you do, you will be given this information sheet to keep and be asked to sign a consent form. You are still free to withdraw at any time and without giving a reason. A decision

to withdraw at any time, or a decision not to take part, will not affect the standard of care you receive.

### **What will happen to me if I take part?**

During the research study you will be asked to take part in a number of psychological tests. The total duration of this will be thirty minutes. These will be carried out while your stay in the Alcohol Problems Clinic, and will involve only you and the main investigator, Fraser Morrison.

The tests will look at the following areas:

- Your mood
- If you are anxious
- How confident you are about remaining sober when you leave
- Your memory and other cognitive abilities
- Any problems you have experienced over the last 3 months as a result of drinking

Following this, the main investigator, Fraser Morrison, shall contact you by telephone three months after you leave the Alcohol Problems Clinic. He will ask you about any drinking you have had over the last three months, and if you have experienced problems as a result of drinking during this time.

### **Expenses and payments**

You will not need to incur any expense or receive payment to take part in this study.

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

During the research study you will be asked to take part in a number of psychological tests. When doing these tests we will ask you to do your best in each task.

You will also be asked about your drinking history, and any problems you have experienced recently as a result of drinking. We would ask that you try to be as honest as possible when answering these questions.

### **What is the drug, device or procedure that is being tested?**

You will not receive any drugs as part of this study.

The procedure will involve some psychological measures. To complete these you will be asked to look at pictures, write numbers or words down, and answer questions. All of these measures are used in everyday routine practice by health professionals.

**What are the alternatives for diagnosis or treatment?**

This study will not affect your treatment in a negative manner. If we uncover any problems from the results of the psychological measures, you shall be offered an appropriate treatment.

**What are the side effects of any treatment received when taking part?**

There are no side effects from taking part in this study.

**What are the other possible disadvantages and risks of taking part?**

There are no likely risks or disadvantages to you from taking part in this study.

**What are the possible benefits of taking part?**

We cannot promise the study will help you but the information we get might help improve the treatment of people with alcohol problems.

The purpose of this study is to look at which factors are important for predicting if people with alcohol problems return to drinking. Should the study uncover whether particular factors are important, then this may be beneficial for your treatment in the future.

**What happens when the research study stops?**

There will be no changes to the services offered to patients in the Alcohol Problems Clinic when the study stops.

**What if there is a problem?**

Any complaint about the way you have been dealt with during the study or any possible harm you might suffer will be addressed'. The detailed information on this is given in Part 2.

**Will my taking part in the study be kept confidential?**

Yes. All the information about your participation in this study will be kept confidential. The details are included in Part 2.

**Contact Details**

Should you have any questions you can contact the main investigator, Fraser Morrison at:

Department of Clinical Psychology  
40 Colinton Road  
Edinburgh  
EH5 5DT

Telephone: 0131 537 6905

**This completes Part 1 of the Information Sheet.**

**If the information in Part 1 has interested you and you are considering participation, please continue to read the additional information in Part 2 before making any decision.**

## **Part 2**

### **What if relevant new information becomes available?**

Sometimes during the course of a research project, new information becomes available about the treatment that is being studied. If this happens, the main investigator, Fraser Morrison, will tell you about it and discuss whether you want to or should continue in the study. If you decide to continue in the study you will be asked to sign an updated consent form.

If the study is stopped for any other reason, you will be told why. Any relevant new information will not affect your continuing care.

### **What will happen if I don't want to carry on with the study?**

You can withdraw from this study at anytime. The information collected prior to this may still be used and also will be kept within your NHS case records.

### **What if there is a problem?**

If you have a concern about any aspect of this study, you should ask to speak with Fraser Morrison who will do his best to answer your questions (0131 537 6905). If you remain unhappy and wish to complain formally, you can do this through the NHS Complaints Procedure. Details can be obtained from the Alcohol Problems Clinic.

Comments of complaints regarding other aspects of your treatment at the Alcohol Problems Clinic should be directed towards a member of staff in the clinic.

### **Harm**

In the event that something does go wrong and you are harmed during the research study there are no special compensation arrangements. If you are harmed and this is due to someone's negligence then you may have grounds for a legal action for compensation against Lothian NHS Trust but you may have to pay your legal costs. The normal National Health Service complaints mechanisms will still be available to you (if appropriate).'

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

All of the information collected about you shall be stored within your NHS records. These remain confidential.

### **Involvement of the General Practitioner/Family doctor (GP)**

Your own GP may be notified of your participation in the trial, only with your consent. No information shall be exchanged with your GP, unless it is in your best interests to do so. If the psychological tests from this study show that you are experiencing a significant problem, your GP may need to be informed of this if he is involved in your future treatment.

### **What will happen to any samples I give?**

The results of all psychological tests shall remain within your NHS records.

### **Will any genetic tests be done?**

This does not apply to this study.

### **What will happen to the results of the research study?**

The results of this study shall be written as a report as part of the requirements of the Doctoral in Clinical Psychology training of the main investigator, Fraser Morrison. This report may also be published within a scientific journal.

You will not be able to be identified from the results of this study, or within any reports that are written following it.

### **Who is organising and funding the research?**

NHS Lothian and the University of Edinburgh are organising this study via the main investigator, Fraser Morrison.

### **Who has reviewed the study?**

This study was given a favourable ethical opinion for conduct in the NHS by the Lothian NHS REC.

**You will be given a copy of the information sheet and a signed consent form to keep.**

**Thank you for considering taking part or taking time to read this sheet.**



\_\_\_\_\_  
Name of Person taking consent (if different from researcher)      Date      Signature

F MORRISON \_\_\_\_\_  
Researcher      Date      Signature

When completed; 1 for patient; 1 for researcher site file; 1 (original) to be kept in medical notes

## **GP Information Sheet**

### **PREDICTORS OF RELAPSE AND OUTCOME IN ALCOHOL DEPENDENCE**

Patient Name:

The aforementioned patient has agreed to take part in a research study. The following information tells you the purpose of this study

Should you have any questions regarding the study, then please do not hesitate to contact me, Fraser Morrison at:

Department of Clinical Psychology  
40 Colinton Road  
Edinburgh  
EH5 5DT

Telephone: 0131 537 6905

#### **What is the purpose of the study?**

Often people who have an alcohol problem find it difficult to remain sober when they have stopped drinking. This can be due to a number of factors.

The aim of this study is to find out which factors influence if a person with an alcohol problem relapses into their previous drinking behaviour.

This study is being carried out to fulfil the requirements of the Doctoral in Clinical Psychology training of the main investigator, Fraser Morrison, in conjunction with Lothian NHS Primary Care Trust.

#### **Why has this patient been chosen?**

This patient is currently attending the Alcohol Problems Clinic, Royal Edinburgh Hospital. All patients within the Alcohol Problems Clinic are being asked to take part in this study. The reason for this is that patients within this clinic have difficulties with alcohol.

#### **Has the patient consented?**

Yes. Participants have been given an information sheet to keep and signed a

consent form. A copy of this is enclosed here.

### **What does the study involve?**

During the research study participants will be asked to take part in a number of psychological tests. The total duration of this will be thirty minutes. These will be carried out while participants stay in the Alcohol Problems Clinic, and will involve only the main investigator, Fraser Morrison.

The tests will look at the following areas:

- Mood
- Anxiety
- How confident participants are about remaining sober when they leave
- Memory and other cognitive abilities
- Any problems they have experienced over the last 3 months as a result of drinking

Following this, the main investigator, Fraser Morrison, shall contact participants by telephone three months after they leave the Alcohol Problems Clinic. He will ask about any drinking over the last three months, and if they have experienced problems as a result of drinking during this time.

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

All of the information collected about shall be stored within NHS records. These remain confidential.

### **Who is organising and funding the research?**

NHS Lothian and the University of Edinburgh are organising this study via the main investigator, Fraser Morrison.

### **Who has reviewed the study?**

This study was given a favourable ethical opinion for conduct in the NHS by the Lothian NHS REC.

**Thank you for considering taking time to read this sheet.**

## **Appendix three – measures**

Aside from those included here, inclusion of any other measures would have breached copyright.

## ALCOHOL RELATED PROBLEMS QUESTIONNAIRE

(all questions relate to the last 6 months)

Name:

Date of Birth:

		YES 1	NO 2
1.	Has the patient been in hospital (or casualty department) related to drinking?		
2.	Has he/she retched or vomited in the morning connected with drinking the day before?		
3.	Has he/she had diarrhoea connected with heavy drinking?		
4.	Has he/she been in an accident (partly) due to alcohol, which came to medical attention or should have?		
5.	Has the patient been depressed due to drinking?		
6.	Has the patient tried to harm him/herself deliberately taking an overdose?		
7.	<b>Complete section (a) or (b)</b>		
	<b>(a)</b> The patient has had a job in the past month:  Has he/she been off sick or absent from work due to drinking? OR Has he/she had any trouble (e.g. warning about lateness or performance)?		
	<b>(b)</b> The patient has had no job in the past month:  Has he/she been unable to fulfil a commitment?		
8.	Have there been arguments at home about drinking in the past month? (If he/she has no home, explore living arrangements and family contacts and include any arguments with friends or general public arising out of his/her drinking).		
9.	In the past month, have there been times when the patient has become so violently angry that he/she hit someone in the family, flat etc? (Living alone – includes violence to others, including the general public).		

<b>10.</b>	<b>Complete section (a) or (b)</b>		
	<p><b>(a)</b> The patient is married:</p> <p>Has had arguments which led to his/her partner threatening to leave, or create such an unpleasant atmosphere that he/she thought of leaving.</p>		
	<p><b>(b)</b> The patient is not married:</p> <p>Has had arguments, which led to friends and relatives threatening to leave or led them to ask the patient to leave, or created such an unpleasant atmosphere that the patient thought of leaving.</p>		
<b>11.</b>	Trouble with police – police involved because of his/her drinking (not necessarily leading to charge).		
<b>TOTAL SCORE:</b>			

**Interviewer:**

**Date:**

**SEVERITY OF ALCOHOL DEPENDENCE QUESTIONNAIRE (SADQ-C)**

NAME \_\_\_\_\_ AGE \_\_\_\_\_ No. \_\_\_\_\_

DATE:

Please recall a typical period of heavy drinking in the last 6 months.

When was this? Month:..... Year.....

Please answer all the following questions about your drinking by circling your most appropriate response.

**During that period of heavy drinking**

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

**ALMOST NEVER SOMETIMES OFTEN NEARLY ALWAYS**

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

**ALMOST NEVER SOMETIMES OFTEN NEARLY ALWAYS**

3. The day after drinking alcohol, my whole body shook violently first thing in the morning

if I didn't have a drink.

**ALMOST NEVER SOMETIMES OFTEN NEARLY ALWAYS**

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

**ALMOST NEVER SOMETIMES OFTEN NEARLY ALWAYS**

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

**ALMOST NEVER SOMETIMES OFTEN NEARLY ALWAYS**

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

**ALMOST NEVER SOMETIMES OFTEN NEARLY ALWAYS**

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

**ALMOST NEVER SOMETIMES OFTEN NEARLY ALWAYS**

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

**ALMOST NEVER SOMETIMES OFTEN NEARLY ALWAYS**

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

**ALMOST NEVER SOMETIMES OFTEN NEARLY ALWAYS**

10. The day after drinking alcohol, I always gulped my first few alcoholic drinks down as

quickly as possible.

**ALMOST NEVER SOMETIMES OFTEN NEARLY ALWAYS**

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

**ALMOST NEVER SOMETIMES OFTEN NEARLY ALWAYS**

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

**ALMOST NEVER SOMETIMES OFTEN ALMOST ALWAYS**

13. I drank more than a quarter of a bottle of spirits in a day (OR 1 bottle of wine OR 7 beers).

**ALMOST NEVER SOMETIMES OFTEN ALMOST ALWAYS**

14. I drank more than half a bottle of spirits per day (OR 2 bottles of wine OR 15 beers).

**ALMOST NEVER SOMETIMES OFTEN ALMOST ALWAYS**

15. I drank more than one bottle of spirits per day (OR 4 bottles of wine OR 30 beers).

**ALMOST NEVER SOMETIMES OFTEN ALMOST ALWAYS**

16. I drank more than two bottles of spirits per day (OR 8 bottles of wine OR 60 beers)

**ALMOST NEVER SOMETIMES OFTEN ALMOST ALWAYS**

**Imagine the following situation:**

1. You have been **completely off drink for a few weeks**

2. You then drink **very heavily for two days**

How would you feel the **morning after** those two days of 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**

**SCORE**

=

\_\_\_\_\_

## **NOTES ON THE USE OF THE SADQ**

The Severity of Alcohol Dependence Questionnaire was developed by the Addiction Research Unit at the Maudsley Hospital. It is a measure of the severity of dependence. The AUDIT questionnaire, by contrast, is used to assess whether or not there is a problem with dependence.

The SADQ questions cover the following aspects of dependency syndrome:

- physical withdrawal symptoms
- affective withdrawal symptoms
- relief drinking
- frequency of alcohol consumption
- speed of onset of withdrawal symptoms.

### *Scoring*

Answers to each question are rated on a four-point scale:

Almost never - 0

Sometimes 1

Often 2

Nearly always 3

A score of 31 or higher indicates "severe alcohol dependence".

A score of 16 -30 indicates "moderate dependence"

A score of below 16 usually indicates only a mild physical dependency.

A chlordiazepoxide detoxification regime is usually indicated for someone who scores 16 or over.

It is essential to take account of the amount of alcohol that the patient reports drinking prior to admission as well as the result of the SADQ. There is no correlation between the SADQ and such parameters as the MCV or GGT.

## **Appendix four – Admission Criterion for Inpatient Unit**

- A diagnosis of alcohol dependence (in line with ICD-10).
- In addition to presence of alcohol dependence, there must be evidence of more complex physiological, behavioural and cognitive consequences from their alcohol consumption, at the severe end of the dependence spectrum
- Evidence of a need for safe in-patient treatment in terms of dangerous physical consequences that may occur if treatment occurs in the community (i.e. those who do not meet criteria for community detoxification under sign guideline 74 (Scottish Intercollegiate Guidelines Network (SIGN). (2003)