The Epidemiology of comorbidity between alcohol use disorders and mental disorders in Australia

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NDARC TECHNICAL REPORT SERIES ON THE NATIONAL SURVEY OF MENTAL HEALTH AND WELL-BEING

This is the eighth in a series of linked Technical Reports on various aspects of the National Survey of Mental Health and Well-Being (NSMH&WB). This survey was a major collaborative effort between numerous Australian academics and institutions. It was funded by the Mental Health Branch of the Commonwealth Department of Health and Aged Care. Fieldwork was conducted by the Australian Bureau of Statistics in 1997. It provides the first data on the prevalence and correlates of common mental disorders and substance use disorders among a representative sample of more than 10,000 Australians aged 18 years and over.

Each of these Technical Reports addresses separate issues related to findings on substance use disorders among Australian adults.

The list of Technical Reports on this topic published to date are:

Hall, W., Teesson, M., Lynskey, M., & Degenhardt, L. (1998). The prevalence in the past year of substance use and ICD-10 substance use disorders in Australian adults: Findings from the National Survey of Mental Health & Well-Being (Technical Report No. 63).

Swift, W., Hall, W. & Teesson, M. (1999). Cannabis use disorders among Australian adults: Results from the National Survey of Mental Health and Well-Being (Technical Report No. 78).

Degenhardt, L., & Hall, W. (1999). The relationship between tobacco use, substance use disorders and mental disorders: Results from the National Survey of Mental Health and Well-Being (Technical Report No. 80).

Degenhardt L., & Hall, W. (2000). The association between psychosis and problematic drug use among Australian adults: Findings from the National Survey of Mental Health and Well-Being (Technical Report No. 93).

Degenhardt, L., Hall, W., Teesson, M., & Lynskey, M. (2000). Alcohol use disorders in Australia: Findings from the National Survey of Mental Health and Well-Being (Technical Report No. 97).

Degendardt, L., Hall, W., & Lynskey, M. (2000). Cannabis use and mental health among Australian adults: Findings from the National Survey of Mental Health and Well-Being (Technical Report No. 98).

Degenhardt, L., Hall, W., & Lynskey M. (2001). Alcohol, cannabis and tobacco use and the mental health of Australians: A comparative analysis of their associations with other drug use, affective and anxiety disorders and psychosis (Technical Report No. 103).

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The development and testing of the computerised survey instrument was undertaken by Gavin Andrews, Lorna Peters, and other staff at the Clinical Research Unit for Anxiety Disorders, and the WHO Collaborating Centre in Mental Health at St Vincent's Hospital. The design of the survey was overseen and the instrument approved by the Technical Advisory Group to the Survey which consisted of the following persons:

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The fieldwork and implementation of the Survey, the enumeration, compilation and initial analyses of the data were undertaken by the Australian Bureau of Statistics. We thank Tony Cheshire, Gary Sutton and Marelle Lawson for their assistance.

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Executive summary

Aims of the report

- This technical report examines the relationship between alcohol use disorders (a DSM-IV diagnosis of either alcohol abuse or dependence) and other mental disorders in the Australian population.

- Specifically, this report has three main aims. The first aim is to report the prevalence of comorbidity between alcohol use disorders and other mental disorders (anxiety, affective and drug use disorders) in the Australian general population. The second aim is to examine the correlates of such comorbidity. The third aim is to examine the factor structure of alcohol dependence in those with and without a comorbid mental disorder.

Method

- This report uses data from the National Survey of Mental Health and Well Being (NSMH&WB). The NSMH&WB was undertaken in 1997 on a representative sample of 10,641 Australians aged 18 years and over (a response rate of 78%). The main objectives of the NSMH&WB were to provide information on the prevalence of the most common mental disorders, the level of disability associated with these disorders, and the health services used and help needed as a consequence of these disorders. Details of the NSMH&WB are presented elsewhere (Andrews et al., 2000).

Prevalence of comorbidity : Alcohol use disorders and mental disorders

- Approximately one-third of respondents with an alcohol use disorder (i.e. DSM-IV alcohol abuse or dependence) met criteria for at least one comorbid anxiety, affective or drug use disorder in the past 12 months.

- The range of comorbid mental disorders in those respondents with an alcohol use disorder and a comorbid disorder was between one and six, with over half of these respondents having just one comorbid mental disorder. Approximately one quarter of these respondents had two comorbid mental disorders and one-fifth had three or more.

- All mental disorders were more common in respondents with an alcohol use disorder, although the strength of association differed by type of mental disorder.

- The odds of having a drug use disorder was 10 times higher, an affective disorder 4 times higher and an anxiety disorder 3 times higher in respondents with an alcohol use disorder.

- The strongest drug associations were with stimulants and cannabis. The strongest reliable associations with affective disorders were with depression and dysthymia.

With respect to anxiety disorders, the strongest association was with post-traumatic stress disorder (PTSD), followed by panic disorder.

- The most prevalent affective disorder was depression (17%), the most prevalent anxiety disorder was generalised anxiety disorder (7%) and the most prevalent drug use disorder was cannabis (14%). Of those individuals with a twelve-month alcohol use disorder, 18% had an affective disorder, 15% had an anxiety disorder and 17% had another drug use disorder.

- Of those respondents with a twelve-month mental disorder, 17% of those respondents with an affective disorder, 16% of those with an anxiety disorder and 35% of those with a drug use disorder also had an alcohol use disorder. With respect to common specific disorders, 16% of respondents with depression, 24% of respondents with PTSD and 37% of those with a cannabis use disorder had an alcohol use disorder.

Correlates of comorbidity : Alcohol use disorders and mental disorders

- To identify the correlates of alcohol related comorbidity, survey respondents were characterised into four groups;

  - "pure alcohol group", respondents with an alcohol use disorder (i.e. DSM-IV alcohol abuse or dependence) and no comorbid mental disorder;
  - "comorbid alcohol group", respondents with an alcohol use disorder and at least one comorbid mental disorder;
  - "other disorder group", respondents with at least one mental disorder but no alcohol disorder;
  - "no disorder group", respondents with no alcohol or other mental disorders.

- These four groups were compared on a range of variables. These were age, gender, marital status, level of education, employment status, physical health, quantity and frequency of alcohol consumption, disability, suicidal behaviour and health service utilisation.

- Relative to respondents with no disorder, respondents in the pure and comorbid alcohol groups were more likely to be male, younger (18-29 years), not in a stable relationship and unemployed.

- The only variable that significantly differentiated between the two alcohol groups was the number of criteria of alcohol dependence. The comorbid alcohol group were fourteen times more likely to have met five or more of the dependence criteria and, subsequently, to have a diagnosis of alcohol dependence than alcohol abuse.

- There was only a slight difference in the quantity and frequency of alcohol consumption between those in the pure and comorbid alcohol groups. Respondents in the comorbid alcohol group drank slightly more alcohol on an average drinking occasion than did respondents in the pure alcohol group.

- Compared to respondents in the no disorder group, those in the pure alcohol group were equally as likely to have taken at least one full or partial day out of role in the previous four weeks. The comorbid alcohol group were, however, three times as likely as the no disorder group to have taken a full or partial day out of role.

- With respect to disability, relative to individuals in the no disorder group respondents in the pure alcohol group were twice as likely and those in the comorbid alcohol group seven times as likely to have a SF-12 mental health score of less than 50 (i.e. to be disabled).

- Suicidal behaviour was highly elevated in the comorbid alcohol group. Relative to individuals in the no disorder group those in the pure alcohol group were twice as likely and those in the comorbid alcohol group six times as likely to have either contemplated or attempted suicide.

- Respondents in the comorbid alcohol group were more likely to seek help for their problems. Respondents in the pure alcohol group were three times as likely and those in the comorbid alcohol group nine times as likely to have sought professional help for their mental or drug and alcohol problems in the previous twelve months than those in the no disorder group.

Factor structure of alcohol dependence : Alcohol use disorders and mental disorders

- Overall, respondents in the comorbid alcohol group were more likely to have a greater number of symptoms of alcohol dependence than respondents in the pure alcohol group. They were significantly more likely to be positive on symptoms indicative of chronic alcohol use; spending more time in obtaining alcohol, giving up social or recreational pursuits because of alcohol and using alcohol despite the knowledge it may be doing you harm.

- Preliminary analysis revealed that in the population of drinkers (i.e. those who had consumed more than 12 alcoholic drinks in the previous twelve months) who had a comorbid mental disorder, the dependence symptoms formed a uni-dimensional syndrome. However, in the population of drinkers without a comorbid mental disorder, the syndrome split into two discrete components. This result was also found in the population of heavy drinkers (i.e. respondents who consumed more than 6 drinks on an average drinking occasion). This finding will be explored in further work.

In sum

- Anxiety, affective and drug use disorders are more common in respondents with alcohol use disorders. Those who were comorbid were also more likely to seek specialist treatment than those without these added disorders. Despite this

increased use of services, these respondents took more days taken out of role, had increased disability and more suicidal behaviour.

- There was little difference in the demographic profiles and drinking habits of respondents with and without comorbid mental disorders. Respondents with comorbid mental disorders did appear, however, to have a more chronic and disabling type of alcohol disorder. Results of the factor analysis of alcohol dependence suggest this by showing different factor solutions in the two groups. The next stage of this research will be to undertake further analysis of the factor structure of alcohol dependence using techniques appropriate to the analysis of the dichotomous data (Muthen, 1993; 1995).

- To identify those most at risk of alcohol related harm future research should examine in more detail the nature of alcohol dependence in these sub-groups. Further information can assist in developing more appropriate and effective initiatives in both prevention and treatment and a subsequent reduction in the burden of illness both for the individual and for society as whole.

1.0 Introduction

1.1 Alcohol disorders and mental disorders in Australia

Mental disorders are common in Australia. The 1997 National Survey of Mental Health and Well Being found approximately one in five Australians reported at least one affective, anxiety or substance use disorder in the previous twelve month period (Andrews et al., 1999). Anxiety disorders were the most common (affecting approximately 10% of the population) followed by substance use (8% of the population) and affective disorders (6% of the population). Of the individuals with substance use disorders, the most prevalent disorders were alcohol-related. Nearly 60% of the population were classified as regular drinkers (i.e. drank at least weekly) and approximately 7% of the population had an alcohol related disorder (alcohol dependence or harmful alcohol use) (Teesson et al., 2000).

These mental disorders have a significant impact on public health in Australia. The Australian Burden of Disease study reported on the number of potential healthy years of life lost due to both premature death and illness (Mathers et al., 2000). Mental disorders in Australia were calculated at 15% of the total burden, third in importance after heart disease and cancer. Affective disorders accounted for nearly one third of the total mental health burden followed by anxiety disorders (23%) and substance use disorders (also 23%). Major depression and alcohol dependence and harmful use ranked as the first and second leading causes of mental health burden respectively.

Alcohol use disorders and other mental disorders are therefore common in Australia and have a significant negative impact on public health. Recent international research from both clinical studies and epidemiological surveys has also shown that these disorders often co-occur (or are comorbid) and that this comorbidity further exacerbates the negative impact on a variety of life and treatment outcomes (Lehman et al., 1993).

1.2 Prevalence of comorbidity: Alcohol use disorders and mental disorders

Evidence from clinical studies

The majority of studies of comorbidity have been completed in clinical samples. Over one-half of patients in psychiatric treatment typically receive more than one diagnosis (Wolf et al., 1998) and three out of four patients in treatment for substance abuse or dependence also have a diagnosis of some other mental disorder (Ross et al., 1988; Rounsaville et al., 1991). Alcohol use disorders and other mental disorders also frequently co-occur and the relationship between these disorders becomes stronger with increasing severity of alcohol problems (Tomasson & Vaglum, 1996; Liskow et al., 1990; Helzer & Pryzbec, 1988).

Clinical studies show that the strongest relationships with alcohol use disorders are for anti-social personality disorders, anxiety and affective disorders (particularly depression) and other drug use disorders (Kessler et al., 1997; Penick et at, 1988; Raimo & Schuckit 1998; Hesslebrock 1991; Brown et al., 1995; Hall & Farrell, 1997). In individuals with alcohol use disorders, depression is more often diagnosed among

women and anti-social personality disorders and drug use disorders among men (Hesselbrock, 1991).

Rates of comorbidity from clinical samples are higher than those in the general population. This is because the referral likelihood for an individual is the result of the combined likelihood of referral for each disorder separately (Du Fort, 1993). Referral biases also inflate the rates of comorbidity in clinical samples. For example, children with parental psychopathology are more likely to be referred to treatment than children without this history (Caron & Rutter, 1991). For these reasons, community samples are used to give more accurate estimates of the extent of comorbidity.

Evidence from population surveys

The Epidemiological Catchment Area Survey (ECA) collected information on the prevalence of specific disorders in the US population. The survey was conducted between 1980 and 1984 on approximately 20,000 respondents aged 18 years and older. Among those respondents with a lifetime alcohol use disorder (alcohol abuse or dependence) 37% had at least one other mental disorder and 22% had another drug disorder (Reiger et al., 1990). Conversely, among individuals with any lifetime mental disorder, 22% had a lifetime history of an alcohol use disorder and 15% had a history of a lifetime drug use disorder.

The National Comorbidity Study (NCS) was undertaken between 1990 and 1992 to examine the extent of comorbidity between substance use and non-substance use disorders in the US population (Kessler et al., 1994; Kessler et al., 1997). The NCS was conducted on approximately 8,000 respondents aged between 15 and 54 years. Among respondents with a lifetime diagnosis of alcohol dependence, 36% of men and 61% of women had an anxiety disorder. The affective disorders were less prevalent with 28% of men and 54% of women with alcohol dependence having at least one affective disorder. Forty-one per cent of men and 47% of women with alcohol dependence also had a drug use disorder. Overall, 78% of men and 86% of women with alcohol dependence had at least one comorbid disorder.

With respect to 12-month comorbidity among respondents with a diagnosis of alcohol dependence, 29% of respondents had at least one affective disorder and the most common of the affective disorders was major depression (28%) (Table 1). More than one-third of respondents (37%) of respondents had at least one anxiety disorder and the most common of these was social phobia (18%). All the mental disorders were found to be more strongly related to alcohol dependence than to alcohol abuse.

Table 1
Conditional probabilities of 12-month co-occurrence of addictive and mental disorders in the US NCS

	Alcohol abuse		Alcohol dependence	
Affective	%	OR	%	OR
Major depressive episode	11.3	1.1	27.9	3.7
Dysthymia	1.1	1.0	3.6	3.9
Mania	0.3	0.7	1.9	6.3
Any	12.3	1.1	29.2	3.6
Anxiety				
Generalised anxiety disorder	1.4	0.4	11.6	4.6
Panic disorder	1.3	0.5	3.9	1.7
Post traumatic stress disorder	5.6	1.5	7.7	2.2
Social phobia	16.0	2.3	18.4	2.8
Simple phobia	10.6	1.2	17.0	2.2
Agoraphobia	4.2	1.1	9.1	2.6
Any	29.1	1.7	36.9	2.6

Source: Kessler et al., 1996, The Epidemiology of Co-occurring addictive and mental disorders: Implications for prevention and service utilization. American Journal of Orthopsychiatry, 66(1) 1996, p:20.

1.3 Correlates of comorbidity : Alcohol use disorders and mental disorders

Although not specific to alcohol disorders, Kessler et al (1994) have also examined the demographic correlates of general comorbidity in the NCS. These authors found that respondents with three or more disorders were more likely to be female, younger, living in a metropolitan area, to have completed less years of secondary schooling and to be in a lower income bracket (Kessler et al., 1994).

The impact of comorbidity between alcohol use disorders and mental disorders is difficult to determine and depends on a variety of factors. These include the severity and nature of the specific co-occurring disorders, the time period measured (for example, 12 months or lifetime) and the assessment instruments used both for diagnosis (clinical diagnosis versus standardised diagnostic instruments) and measurement of life outcomes. Despite these factors, a review of the literature has shown that comorbidity has a clear impact in two main areas; treatment seeking and life outcomes, in particular, suicidal behaviour.

Treatment seeking

Analysis of the NCS found that respondents with comorbid disorders were more likely to use specialist treatment services (Kessler, 1995). In the ECA data, respondents with an alcohol use disorder in specialist treatment services were nearly four times as likely to have a comorbid mental disorder compared to respondents not in treatment (Reiger et al., 1990). Wu et al (1999) analysed the NCS in more detail to determine the specific impact of comorbidity between mental and alcohol use disorders on health service utilisation (Wu et al., 1999).

This analysis involved the construction of five groups of respondents from the NCS data; respondents with alcohol dependence or abuse and no other mental disorder in the previous year, those with alcohol abuse or dependence and at least one other comorbid mental disorder in the previous year, those with a mental disorder other than an alcohol disorder in the previous year, those with a mental disorder in their lifetime but not in the previous year, and those with no mental disorder in their lifetime. Results showed that respondents in the comorbid alcohol disorder group were higher users of services than those in either the pure alcohol or the pure psychiatric groups. More specifically, factors that predicted service utilisation in the comorbid alcohol group were; being aged between 36 and 44 years of age, being separated, widowed or divorced, having legal problems recently, having a parent with a history of psychopathology, having a household income of $35,000 - $69,999 or $20,000 - $34,999 and having at least three symptoms of alcohol dependence.

Life outcomes

Overall, studies from the clinical environment show that individuals with severe mental illnesses and co-occurring substance use disorders have more psychopathology, poorer treatment outcomes, a more severe illness course, disruptive behaviour, medication non-compliance, incarceration and homelessness (Lehman et al., 1993; Drake et al., 1996).

Although there is variation by specific mental disorder, results indicate that comorbidity can also have a negative impact on individuals with alcohol use disorders (Glenn & Parsons, 1991). For example, men with anti-social personality disorder as well as an alcohol use disorder have an earlier age of onset of the alcohol use disorder, a more severe and chronic course of the disorder and more problems from their drinking. There is also a tendency to drop out of treatment and experience poor treatment outcomes (Hesselbrock, 1991).

It is more difficult to establish the impact of depression on treatment for alcohol use disorders. This is because it is hard to differentiate depression that is secondary to alcohol intoxication and withdrawal and depression that occurs as a primary disorder (Davidson et al., 1995; Hasegawa, 1991 McGrath et al., 1996; Brown & Schuckit, 1988). Results of previous research have, however, suggested a gender effect, although these results are equivocal. Lynskey (1999) in his review article points out that studies that conclude that comorbid affective disorders do not affect treatment outcome are based on samples of men and that this finding is not necessarily applicable to women. Rounsaville et al (1987) report that depression may in fact be protective against alcohol use disorders for women.

A review of the relationship between alcohol use disorders and anxiety disorders suggests that anxiety disorders can lead to a poorer outcome in alcohol treatment and an increase in the possibility of treatment relapse (Kushner et al., 2000; Fischer & Goethe, 1998). Drug abuse and dependence have also been associated with poor alcohol related outcomes (Kranzler et al., 1996).

Overall, results of clinical studies indicate that comorbid mental disorders are highly prevalent among individuals with alcohol disorders, and the impact of these disorders

is generally negative, although this may not be the case for all mental disorders or all subgroups of clients.

Of particular concern is the strong relationship between comorbidity and suicidal behaviour. The ECA has shown a strong positive relationship between depression, active alcohol use disorders and suicide attempts (Petronis et al., 1990). The National Longitudinal Alcohol Epidemiological Survey (NLAES) was undertaken in 1992 on approximately 18,000 US residents aged 18 years and older who were current drinkers. Analysis of this data showed that respondents who contemplated suicide were significantly more likely to have an alcohol use disorder and depression in the previous year compared to those who did not contemplate suicide (Grant & Hasin, 1999). The risk of suicide was, however, more strongly related to depression than to alcohol dependence. Bronisch & Wittchen (1994) report on an epidemiological study of the adult German population. Results of this study indicate that comorbidity of depression with panic disorder or substance abuse increased the odds for suicide attempts. The combination of major depression and substance abuse disorders (including alcohol use disorders) increases the risk of suicidal attempts fifteen fold.

1.4 Explanation of comorbidity : Alcohol use disorders and mental disorders

Explanations for the high rates of comorbidity between alcohol use disorders and mental disorders fall into four main areas.

Firstly, one mental disorder may lead to another. For example, alcohol may be used to self-medicate in order to relieve the distress of mental illnesses such as anxiety and depression. Although this form of self-medication may be effective in the short term it may also lead to substance use disorders in the longer term (Cappell & Greeley, 1987; Kessler, 1995). Conversely, substance use may cause other mental disorders (Shuckit et al., 1997).

Secondly, comorbidity between substance use disorders and other mental disorders may be due to common causes. Social disadvantage, community context, stress and lack of social support play a significant role in both substance use and mental health disorders such as depression and anxiety (Kessler, 1995).

Thirdly, comorbidity may be produced artifactually as a result of the nature of the populations being sampled or through the systems of diagnosis used (Caron & Rutter, 1991; Maser et al., 1997). As outlined previously, comorbidity is more frequently detected in treatment samples than in the general population. Comorbidity will also be more frequently detected if assessment involves the use of screening instruments rather than diagnostic systems that use a hierarchical method of classification. For example, if screening assessments are used without taking other disorders into account a client may be given two separate diagnosis (alcohol withdrawal and depression) when a single diagnosis of alcohol withdrawal is more appropriate. However, if DSM-IV is used then the depression will only be recorded as a primary disorder if it does not occur as a result of substance use.

However, it has also been argued that comorbidity may still be an artifact of the diagnostic system currently used (DSM-IV) because, at a broader level, it artificially splits diagnostic criteria into separate classes when they actually belong together

(Wittchen, 1996). For example, an individual suffering from depression, alcohol dependence and anxiety may in fact be suffering from a more complex and/ or severe type of psychiatric disorder, rather than three completely separate and distinct disorders. Alternatively, they may be at a more serious stage of a particular disorder (Kessler, 1995; Wittchen, 1996). Examination of the factor structure of comorbidity in the general population may add to this discussion.

1.5 Factor structure of alcohol dependence : Alcohol use disorders and mental disorders

Current thinking on alcohol dependence was derived originally from the work of Jellinek, following the era of Prohibition in the US (Jellinek, 1946; Jellinek, 1952). Jellinek viewed alcoholism as a chronic disease with a distinct pattern of symptoms occurring at particular stages and characterised by loss of control over alcohol intake. However, later research on Jellineks model found inconsistencies. For example, studies demonstrated that respondents could in fact regain control over alcohol use and did not have to go through a particular set of stages in a particular order (Davies, 1962; Miller, 1983).

The next major work on alcohol dependence in this area was undertaken by Edwards and Gross (1976) who identified seven criteria as intrinsic to what they termed the Alcohol Dependence Syndrome (Table 2). This model was more flexible than that previously proposed by Jellinek (1946, 1952). Rather than involving a rigid set of symptoms and stages, Edwards and Gross emphasised the fact that people could move in and out of dependence and that loss of control was not necessarily the defining characteristic of the syndrome.

Table 2
Criteria of the Alcohol Dependence Syndrome (Edwards and Gross, 1976)

- Narrowing of the drinking repertoire,
- Salience of drink-seeking behaviour,
- Increased tolerance,
- Repeated withdrawal symptoms,
- Relief avoidance of withdrawal symptoms,
- Selective awareness of a compulsion to drink, and
- Reinstatement of drinking after abstinence.

Following the work of Edwards and Gross, the American Psychiatric Association introduced diagnostic criteria for alcohol dependence and abuse into the third edition of its Diagnostic and Statistical Manual (DSM-III). The criteria for a diagnosis of dependence followed closely those developed by Jellinek, rather than those of Edwards and Gross. For example, the presence of symptoms of withdrawal or tolerance were necessary for a positive diagnosis of alcohol dependence. The abuse category was constructed for respondents who drank in a hazardous manner, but did not exhibit signs of tolerance or withdrawal.

The American Psychiatric Association undertook revisions to the DSM-III and produced the DSM-IV in 1994. In DSM-IV alcohol dependence became more similar to that proposed by Edwards and Gross with tolerance and withdrawal no longer being required for a positive diagnosis. Rather, three of the seven criteria outlined in Table 3

needed to be reported. A diagnosis of alcohol abuse was made when respondents had social and legal problems but did not meet criteria for alcohol dependence.

Table 3
DSM-IV Alcohol Dependence and Abuse

Alcohol Dependence

Alcohol dependence is defined as a maladaptive pattern of drug use leading to clinically significant impairment or distress, as manifested by three or more of the following; occurring at any time in the same 12 month period.

(1) Tolerance, as defined by either of the following: (a) a need for markedly increased amounts of the drug to achieve intoxication or desired effect, (b) markedly diminished effect with continued use of the same amount of the drug.
(2) Withdrawal as manifested by either of the following: (a) the characteristic withdrawal syndrome for the drug (two or more of autonomic hyperactivity, increased hand tremor, insomnia, nausea or vomiting, transient visual., tactile, or auditory hallucinations or illusions, psychomotor agitation, anxiety, grand mal seizures; (b) the same (or a closely related drug is taken to relieve or avoid withdrawal symptoms.
(3) The drug is often taken in larger amounts or over a longer period than was intended.
(4) There is a persistent desire or unsuccessful efforts to cut down or control drug use
(5) A great deal of time is spent in activities necessary to obtain the drug, use the drug, or recover from its effects
(6) Important social., occupational., or recreational activities are given up or reduced because of drug use
(7) The drug use is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by the drug

Alcohol Abuse

Criterion A – A maladaptive pattern of drug use leading to clinically significant impairment or distress, as manifested by one (or more) of the following, occurring within a 12 month period.

(1) recurrent drug use resulting in failure to fulfil major role obligations at work, school or home.
(2) Recurrent drug use in situations in which it is physically hazardous
(3) Recurrent drug-related legal problems
(4) Continued drug use despite having persistent or recurrent social or inter personal problems caused or exacerbated by the effects of the drug

The dimensionality of DSM-IV alcohol abuse and dependence in relation to comorbidity

Since the publication of the DSM-IV, a number of studies have been undertaken to assess whether the categories of alcohol abuse and dependence are homogenous and form a single dimension. Two main methods have been used for assessment. The first method involves a comparison of the observed number of combinations of criteria to the theoretically predicted number of possible combinations. The second method used involves factor analysis of specially constructed questionnaires that measure diagnoses at both the symptom and criteria levels to see if the symptoms form one dimension or multiple dimensions. These studies have been undertaken in the general population and among clinical samples.

Combination of criteria

Grant has assessed the homogeneity of both DSM-III and DSM-IV criteria of alcohol abuse and dependence using data from large-scale epidemiological surveys in 1992 and 2000 respectively (Grant et al 1992; Grant 2000). Homogeneity was established by

comparing the observed number of combination of criteria to the theoretically predicted number of possible combinations. Results demonstrated that both alcohol abuse and alcohol dependence are relatively homogenous concepts.

Using DSM-IV they found that only approximately half the theoretically predicted subtypes of abuse and dependence were observed from the data. Approximately 90% of respondents predicted by abuse could be represented by three sub-types of abuse and 70% of respondents with dependence could be characterised by just six sub-types of dependence. With regards to alcohol dependence, criteria of dependence representing physiological dependence (tolerance and withdrawal) and impaired control over drinking were identified as playing a key role, appearing in approximately 80% of all reported subtypes, regardless of age, race or gender.

Factor analysis

Previous research on the factor structure of alcohol dependence is equivocal and varies according to the populations studied and instruments used. To date, studies have reported different solutions according to the gender and drinking status of the populations sampled (see for example, Rounsaville et al., 1993; Caetano, 1990; Hall et al., 1993).

Rounsaville et al (1993) assessed the cross-system agreement between alcohol and drug use disorders for DSM-III-R, DSM-IV and ICD-10. Subjects (n=521) were recruited from five different substance abuse treatment settings and were administered the Composite International Diagnostic Interview (CIDI). The CIDI is a structured interview that permits classification according to DSM-III-R and ICD-10 substance use disorders criteria. At the time of this study the DSM-IV criteria were under proposal and the CIDI did not measure all the DSM-IV criteria that were subsequently included. Results of exploratory factor analysis indicated a one-factor structure solution for each of the three diagnostic systems for all categories of drug and alcohol disorders including alcohol dependence.

Allen et al (1994) used the Alcohol Dependence Scale (ADS) to assess the factor structure of alcohol dependence. The ADS consists of 25 closed-ended brief, self-report items dealing with various aspects of alcohol use, including drinking patterns, physiological and emotional reactions to alcohol, and acute withdrawal effects which have occurred during the previous 12 months. Subjects were recruited from community-based, abstinence-oriented inpatient and outpatient alcoholism treatment facilities in the US (200 subjects) and Russia (223 subjects). All subjects met diagnostic criteria for alcohol dependence. Results of a factor analysis demonstrated a four factor solution for both the US and Russian samples. Consideration of the factor loadings showed the factors to correspond to psycho-perceptual withdrawal., psycho-physical effects of withdrawal., loss of behavioural control over drinking and obsessive drinking style.

Caetano (1990) examined the factor structure of alcohol dependence in both the DSM-III-R and ICD-10 classification systems. The sample consisted of 381 subjects admitted to detoxification and residential alcohol treatment programs in California. The operational definition of alcohol dependence was based on a series of 43 items covering the various indicators of dependence in DSM-III, DSM-III-R and ICD-10.

Analysis of the DSM-III-R factor structure showed a four-factor solution both for women and men, although the nature of the solutions (i.e. the particular items loading on the factors) varied by gender implying the nature of dependence may differ in subgroups of the population.

Caetano et al (1999) examined the factor structure of DSM-IV alcohol dependence in Mexican and American treatment populations. Clients were recruited from five public detoxification and residential alcohol treatment programs. Alcohol dependence was based on a series of questions administered as part of the CIDI-SAM – an automated program that allows for symptom, criteria and diagnosis level using DSM-IV. Dimensionality was assessed using confirmatory factor analysis. Results suggest a uni-dimensional syndrome among the US sample but a rejection of uni-dimensionality of the syndrome in the Mexican sample. The authors argue that these differences may be accounted for by different cultural manifestations of alcohol dependence and/ or as a result of different methods of client selection in the various sites.

Kosten et al (1987) evaluated the factor structure of the DSM-III-R dependence criteria for substance-abuse diagnosis among 83 patients from an outpatient substance-abuse treatment unit (41 patients) and an inpatient psychiatric unit (42 patients). The dependence syndrome was assessed for alcohol, sedatives, hallucinogens, stimulants, cannabis, cocaine and opiates. Assessment was made through the Structured Clinical Interview for DSM-III (SCID). The SCID provides an interview guide for determining whether subjects meet DSM-III-R criteria for a range of psychiatric disorders. Dimensionality of the factor structure of dependence for each drug type was assessed using Guttman scaling and factor analysis. Results from the Guttman scaling showed alcohol dependence to have a good approximation to a 'perfectly' uni-dimensional and cumulative scale. Subsequent factor analysis showed each of the items used to load onto a single factor, explaining 56% of the variance.

Hall et al (1993) have assessed the cross-cultural validity of the Alcohol Dependence Syndrome in six countries: Australia, Bulgaria, Kenya, Mexico, Norway and the US. Subjects were recruited from primary care and hospital settings and formed three groups; those who currently sought treatment for medical problems other than an alcohol problem, clinically diagnosed "alcoholics" and non-drinkers. Principal Components Analysis was undertaken on questions measuring the presence of each of the symptoms of alcohol dependence in the drinking population. These authors found strong evidence for the uni-dimensionality of the dependence items. In all of the centres, the first single Principal Component accounted for more than half the total variance.

Muthen et al (1993) investigated that dimensionality of DSM-III-R and DSM-IV criteria for alcohol abuse and dependence using the 1988 National Health Interview Survey (NHIS88). The NHIS88 evaluated alcohol use and alcohol problems in a nationally representative sample of 47 485 US households. To analyse the criteria for alcohol dependence and abuse the authors factor analysed a set of questions measuring eleven areas relevant to alcohol dependence and abuse. Using this method the authors found the criteria reduced to two dimensions that represent two distinctly different phenomena. They claim that this provides evidence that alcohol abuse is not simply a less severe form of dependence. The first dimension (F1) was characterised by the criteria of drinking more or for longer than intended and driving after drinking too

much. These criteria were also the most prevalent in the sample and the dimension was interpreted as the less severe of the two and corresponding to alcohol abuse. The second dimension (F2) was characterised by an understanding that drinking was excessive and an inability to cut down or stop, giving up or reducing previous activities in favour of drinking and continuing to drink despite the recognition that drinking was causing problems in one or more areas of functioning. F2 was interpreted as the more severe dimension and corresponded to dependence.

It is of interest to note that the results for the physiological dependence criteria were unstable. In the initial Muthen analysis, the criteria used to measure tolerance, withdrawal and relief loaded more heavily on the more severe dimension (F2). However, in conducting a validation exercise on the data, although the data again reduced to two dimensions, the criteria used to measure tolerance, withdrawal and relief loaded more heavily on the less severe dimension. As the authors report, the instability of these criteria may provide evidence for the diagnosis of alcohol dependence without the requirement of physiological dependence. However, as they further point out, it may also be the case that particular subgroup differences account for the instability. This hypothesis is supported by the results of Caetano et al (1999) who have shown the syndrome is not uni-dimensional in some cultural groups.

1.6 Limitations of current research

Previous international research has shown that comorbidity between alcohol disorders and other mental disorders is common and has a generally negative impact on treatment for alcohol use disorders. To date, however, there has been no description or quantification of the impact of comorbid mental disorders on individuals with alcohol use disorders at the population level in the Australian context. Previous research has also demonstrated that the factor structure of alcohol dependence might differ cross-culturally and in particular subgroups of the population. However, analysis has not yet demonstrated whether the presence of particular mental disorders might change the nature of alcohol dependence, despite the significant implications this would have for current systems of psychiatric diagnosis. This report sets out to address these research deficits by providing the first nationally representative data on the prevalence, outcomes and factor structure of alcohol related comorbidity in the Australian population.

Study aims

Specifically, this report has three main aims.

(1) The first aim is to report the prevalence of the comorbidity between alcohol use disorders and other mental disorders (anxiety, affective and drug use disorde u Ø ¤ œ h œ h œ h œ h œ h [A [A [A [A © , © u © u © u © u © , © , © , © , h œ u ©

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é ére to provide information on the prevalence of the most common mental disorders, the level of disability associated with these disorders, and the health services used and help needed as a consequence of a mental problem for Australians aged 18 years and over. The range of major mental disorders included in the survey were those with the highest prevalence in the population and which were also able to be identified in an interviewer based household survey. The interview was restricted to symptoms in the last twelve months to minimise the uncertainty of recall of symptoms over longer time periods. The survey questions were approved by the Australian National University Ethics Committee, and consultations with the Privacy Commissioner continued throughout survey development.

The diagnostic component of the interview was administered through a modified version of the Composite International Diagnostic Interview (CIDI). The CIDI was initially produced as part of a major joint project between the World Health Health Health Organisation (WHO) and the United States Alcohol, Drug Abuse and Mental Administration during the 1980s. It is a comprehensive interview for adults which can be used to assess current and lifetime prevalence of mental disorders through the measurement of symptoms and their impact on day-to-day activities. The CIDI enables the diagnoses of mental disorders based on either the International Classification of Diseases – 10th revision (ICD-10) or the Diagnostic and Statistical Manual of Mental Disorders – 4th revision (DSM-IV). Analyses of the data for this report have been undertaken using DSM-IV categories for diagnosis.

The CIDI assessments have been shown to have excellent inter-rater reliability in international field trials (Cottler et al., 1991; Wittchen et al., 1991) and the test-retest reliability has been shown to be good (Andrews & Peters, 1998; Cottler et al., 1991; Wittchen et al., 1991). As with all measures, assessing the validity is more difficult. There are few studies of the validity of the CIDI assessments for substance use disorders. Janca et al (1992) compared CIDI diagnoses to diagnosis completed by clinicians using a checklist after observing the administration of the CIDI. The overall agreement between the CIDI and the clinical diagnosis was good (Kappa = 0.77).

2.2 Variables used in the current analysis

DSM-IV mental disorders

DSM-IV mental disorders included in the present analysis are outlined Table 4.

Table 4
DSM-IV mental disorders included in the NSMH&WB and in the present analysis

Anxiety disorders

- Panic disorder
- Agoraphobia
- Social phobia
- Generalised anxiety disorder
- Obsessive-compulsive disorder
- Post-traumatic stress disorder

Affective disorders

- Depression
- Dysthymia
- Mania
- Hypomania
- Bipolar (affective) disorder

Drug and Alcohol disorders

- Alcohol abuse and dependence
- Cannabis abuse and dependence
- Opiate use and dependence
- Stimulant use and dependence
- Sedative use and dependence

Correlates

Variables used are those indicated by previous research to be related to alcohol dependence and/ or alcohol related comorbidity. These are age, gender, marital status, labour force status, education, physical health, suicidal behaviour, disability and health care utilisation. Suicidal behaviour was defined as whether a respondent had ever contemplated or attempted suicide. Level of disability was measured by the SF-12, a twelve item standard international instrument that provides a generic measure of health status (Ware et al., 1996). Days out of role was defined as the addition of the number of days when respondents were totally or partially unable to work or carry out normal activities. Health service utilisation was assessed by the number of consultations with health professionals in the previous twelve months and the proportion of these that were related to mental problems such as stress, anxiety, depression, or dependence on drugs or alcohol. Details of the coding for all these variables is included in Appendix 1.

2.3 Sampling

The NSMH&WB was conducted throughout Australia by the Australian Bureau of Statistics using stratified multistage area sampling of private dwellings. The area-based selection ensured that all sections of the population living in private dwellings within the geographical scope of the survey were represented in the sample. Each

State and Territory was stratified geographically and independent samples were selected from each stratum.

Each stratum contained a number of Collection Districts (CDs) defined for the 1991 Population and Housing Census. A sample of these blocks was selected for inclusion in the survey and a systematic random sampling of dwellings was selected from these blocks. Only one respondent per household was interviewed and the scope of the survey included only those aged 18 years or over usually resident at the dwelling. 10,641 responding interviews were achieved representing a response rate of 78%.

2.4 Weights

The survey estimates conform to independent estimation of the Australian population for the third quarter of 1997. Specifically, the estimates conform to national age by sex population estimates, and State/ Territory by part of State population estimates. A post stratification method was used to weight the data according to state by part of state by sex by age group levels, with each unit assigned an initial weight equal to the inverse of the probability of selection of the unit. These initial weights were then adjusted to sum to known population benchmarks to give final weights (Australian Bureau of Statistics, 1997, 1999).

Due to the complex sample design and weighting of the NSMH&WB, special analysis procedures were used in this report to adjust standard errors for the purposes of testing the statistical significance of measures of association. Adjustment involved the use of Jackknife methods of replication in 30 design based balanced sub-samples. Replication methods involved repeatedly selecting sub-samples from the whole sample. For each sub-sample the statistic of interest is calculated. The variance of the full sample statistic is then estimated using the variability among the replicate statistics calculated from the sub-samples.

2.5 Statistical analysis

To account for the complex survey design, statistics presented in this report have been calculated using SUDAAN 7.5 (Software for the Statistical Analysis of Correlated Data) with adjustment using Jackknife method of replication (Shah et al., 1997).

Prevalence : Alcohol use disorders and mental disorders

To examine the prevalence of alcohol related comorbidity information is presented about the number and type of comorbid mental disorders experienced by respondents with DSM-IV alcohol dependence or an alcohol use disorder (i.e. either DSM-IV alcohol abuse or dependence). Associations specifically with alcohol abuse are not presented. This is because each of the cross-tabulations between alcohol abuse and each specific mental disorder contain at least one cell with a count of less than five and odds ratios are therefore unreliable. Alcohol dependence and abuse have been combined into a measure of alcohol use disorder to reflect the extent of “alcohol use disorders” in the community. Co-occurrence between disorders are measured by odds-ratios and 95% confidence intervals. Associated prevalence estimates (conditional prevalences) are presented with standard errors.

Correlates: Alcohol use disorders and mental disorders

To examine the correlates of comorbidity four groups of respondents were constructed from the data.

The "pure alcohol disorder" group – respondents with either DSM-IV alcohol abuse or dependence and no comorbid anxiety, affective or drug use disorders);

The "comorbid alcohol disorder" group - respondents with either DSM-IV alcohol abuse or dependence and at least one comorbid anxiety, affective or drug use disorder

The "other disorder" group - respondents with at least one anxiety affective or drug use disorder but without DSM-IV alcohol abuse or dependence

The "no disorder" group - respondents who had no anxiety, affective, drug or alcohol use disorder measured by the survey.

Initially, univariate results are reported between the groups with respect to each of the correlates. The significance of univariate associations are measured with Chi-squared statistics. This information is presented visually as pie and bar charts. Appendix 2 contains associated prevalence estimates and standard errors.

Crude odds ratios are presented to examine the associations between the four groups and disability, suicidal behaviour and health service utilisation. Multinomial logistic regression is used to assess the change in this relationship after controlling for age, gender, education, employment and marital status. In this analysis the no disorder group is used as the referent group category. The test for each effect is based on the change in the value of –2 log-likelihood if the effect is removed from the final model

Factor structure of alcohol dependence : Alcohol use disorders and mental disorders

To assess the structure of alcohol dependence in respondents with and without a comorbid mental disorder a preliminary Principal Components Analysis (PCA) was used to reduce the data. Factors with Eigenvalues of one or more are reported. As the symptoms of alcohol dependence are correlated an oblique method of factor rotation was used (Direct Oblimin). The next planned stage of this research will be to undertake further analysis of the factor structure of alcohol dependence using techniques which account for the dichotomous nature of the alcohol dependence data.

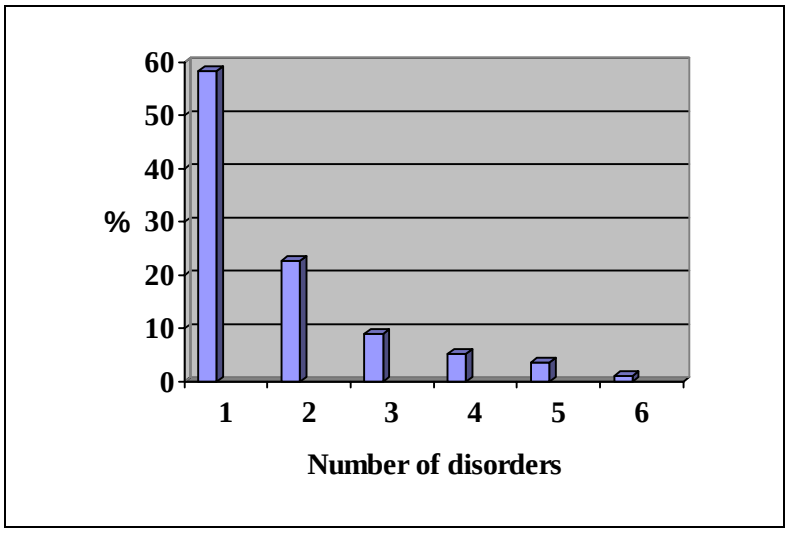
Component loadings of greater than (+-) .30 are considered to meet the minimal level; loadings of (+-) .40 are considered more important; and if the loadings are (+-) .50 or greater they are considered practically significant (Hair et al., 1995). For the purposes of the present analysis the mid range option is selected and component loadings of .40 or higher are taken as significant. As research has demonstrated that different factor structures exist according to drinking status of respondents, the PCA's are undertaken firstly on all drinkers (i.e. those who consumed more than twelve drinks in the previous 12 months) and secondly on heavy drinkers (i.e. respondents who consumed more than 6 drinks on an average drinking occasion). This cut-off is consistent with current National Health and Medical Research Council Guidelines on Safe Drinking (NH&MRC, 2000).

3.0 Results

Section 1
Prevalence of comorbidity : alcohol use disorders and mental disorders

3.1.1 Number of comorbid disorders in individuals with alcohol use disorders
Approximately one-third (36%) of respondents with an alcohol use disorder had at least one comorbid anxiety, affective or drug use disorder. Figure 1 shows the range of disorders was between one and six, with over half the respondents with a comorbid disorder having just one comorbid disorder (58%). Approximately one quarter of respondents had two comorbid disorders (23%), and the remainder (19%) had three or more.

Figure 1
Number of comorbid diagnosis in individuals with alcohol use disorders, who have at least one comorbid mental diagnosis



3.1.2 Extent of the relationship between alcohol use disorder, alcohol dependence and other mental disorders
Table 5 presents the conditional prevalences. Entries in the column labelled A are the percentage of respondents with a given 12-month alcohol use disorder (indicated by the column heading) who also had a particular 12-month mental disorder. For example, the entry in the upper left corner of the table shows that 0.6% of respondents with an alcohol use disorder also had a bipolar disorder. Entries in the column labelled M are the percentage of respondents with a given 12 month mental disorder (indicated by the row heading) who also had an alcohol disorder (indicated by the column heading). For example, 32% of respondents who suffered a bipolar disorder also met criteria for an alcohol use disorder.

Of those individuals with an alcohol use disorder, 18% had an affective disorder, 15% had an anxiety disorder and 17% had another drug use disorder. The most prevalent affective disorder was depression (18%), the most prevalent anxiety disorder generalised anxiety disorder (7%) and the most prevalent drug disorder cannabis (14%).

Of those respondents with a twelve-month mental disorder, 17% of respondents with an affective disorder, 16% of those with an anxiety disorder and 35% of those with a drug use disorder had an alcohol use disorder. The most prevalent affective disorder was bipolar disorder (32% had an alcohol use disorder), the most prevalent anxiety disorder PTSD (24% had an alcohol use disorder) and the most prevalent drug disorder was for stimulants (62% had an alcohol use disorder). Overall, 37% of respondents with an alcohol disorder had at least one other mental disorder and 19% of respondents with a mental disorder had an alcohol use disorder.

Table 5
Prevalences and standard errors of DSM-IV mental disorders

DSM-IV diagnosis	A – percentage of subjects with 12 month alcohol use disorder who also have a mental illness	M – percentage of subjects with 12 month mental disorder who also have an alcohol use disorder
Bipolar	0.6 (0.5)	31.7 (18.4)
Dysthymia	2.8 (0.7)	16.2 (4.0)
Depression	16.8 (2.9)	16.1 (1.7)
Any affective	**18.4 (2.7)**	**16.6 (1.5)**
Panic	3.5 (0.8)	19.7 (3.9)
Agoraphobia	1.0 (0.4)	12.6 (5.0)
Social Phobia	3.7 (0.9)	16.7 (3.7)
Obsessive compulsive	1.6 (0.5)	14.8 (4.7)
PTSD	5.4 (1.0)	24.1 (4.2)
Generalised anxiety	7.1 (1.4)	16.7 (3.3)
Any anxiety	**14.9 (1.7)**	**16.0 (2.0)**
Sedative	2.9 (0.7)	36.5 (7.7)
Stimulant	3.6 (1.1)	61.8 (9.4)
Cannabis	13.8 (2.5)	37.1 (3.8)
Opioids	1.5 (0.6)	31.2 (10.0)
Drug	**16.8 (2.5)**	**35.5 (3.6)**
Any disorder other than alcohol	**36.5 (4.1)**	**18.9 (1.3)**

3.1.3 Strength of the association between alcohol use disorder, alcohol dependence and other mental disorders

There was a significant association between the presence of at least one comorbid anxiety, affective or drug use disorder and having an alcohol use disorder (Wald F=46.70; df=1; p<0.001). After controlling for gender, age, marital status, employment, and level of schooling in a logistic regression, the odds of having a mental disorder were four times higher in respondents with an alcohol use disorder (OR=4.1; 95% CI 2.7, 6.3).

Table 6 presents odds ratios and 95% confidence limits for the relationships between alcohol dependence, alcohol use disorders (i.e. the combination of alcohol abuse and dependence) and specific anxiety, affective and drug use disorders. All the odds ratios are significant. The odds ratios with alcohol dependence were similar for the affective (OR 5.0; 95% CI 3.3, 7.5) and anxiety disorders (OR 4.6; 2.9, 7.2). Of the affective disorders, the highest reliable associations were with depression (OR 4.6; 2.9, 7.4) and dysthymia (OR 4.6; 2.4, 8.6). Of the anxiety disorders, the highest association was

with post-traumatic stress disorder (7.0; 4.2, 11.8) followed by panic disorder (OR 5.3; 2.8, 10.1).

Respondents with an alcohol use disorder were more likely to have each of the mental disorders specified, relative to respondents without an alcohol use disorder. The odds were strongest for the relationship between alcohol use disorders and other drug use disorders (OR 10.1; 6.5, 15.6). The strongest specific drug associations were with cannabis (OR 10.5; 6.8, 16.2) and stimulant disorders (26.1; 11.1, 61.1). The odds were similar for the affective (OR 3.6; 2.5, 5.0) and anxiety disorders (OR 3.3; 2.3, 4.8).

Table 6
Odds ratios and 95% confidence limits for the association between alcohol dependence, alcohol use disorders and mental disorders

DSM-IV disorder	Alcohol dependence	Alcohol use disorder
Bipolar	*10.8 (1.8, 64.2)	*7.3 (1.2, 43.4)
Dysthymia	4.6 (2.4, 8.6)	3.1 (1.6, 5.7)
Depression	4.6 (2.9, 7.4)	3.4 (2.3, 5.0)
Any affective	**5.0** **(3.3, 7.5)**	**3.6** **(2.5, 5.0)**
Panic	5.3 (2.8, 10.1)	3.9 (2.3, 6.7)
Agoraphobia	*3.4 (1.3, 8.9)	*2.3 (0.9, 5.8)
Social Phobia	4.9 (2.6, 9.0)	3.2 (1.8, 5.8)
Obsessive compulsive	3.4 (1.3, 9.1)	2.7 (1.2, 6.2)
PTSD	7.0 (4.2, 11.8)	5.2 (3.3, 8.1)
Generalised anxiety	4.4 (2.4, 8.0)	3.3 (1.9, 5.6)
Any anxiety	**4.6** **(2.9, 7.2)**	**3.3** **(2.3, 4.8)**
Sedative	11.4 (4.3, 30.6)	9.2 (4.4, 19.0)
Stimulant	30.5 (11.3, 82.6)	26.1 (11.1, 61.1)
Cannabis	10.5 (6.9, 16.0)	10.5 (6.8, 16.2)
Opioids	10.7 (3.9, 29.5)	7.2 (2.6, 19.5)
Any drug	**10.8** **(7.0, 16.5)**	**10.1** **(6.5, 15.6)**

* cell size less than five

3.1.4 Summary

Approximately one-third of respondents with an alcohol use disorder had at least one comorbid anxiety, affective or drug use disorder. Over half of these respondents had one extra disorder and one-fifth had three or more disorders. All mental disorders were more common in respondents with an alcohol use disorder. The odds were highest for other drug use disorders, specifically for cannabis. The odds ratios were similar for affective and anxiety disorders. Of the affective disorders, the highest odds was for depression and of anxiety disorders, the highest was with post-traumatic stress disorder followed by panic disorder. The pattern is the same for alcohol dependence as for alcohol use disorder, although the odds ratios are consistently lower for alcohol use disorders.

Section 2
Correlates of comorbidity : alcohol disorders and mental disorders

The aim of this section is to analyse the correlates of comorbidity. Correlates examined are age, gender, marital status, employment status, level of education, physical health, degree of disability, suicidal behaviour and health service utilisation. To examine these correlates four groups of respondents were constructed from the data;

The "pure alcohol disorder" group – respondents with either DSM-IV alcohol abuse or dependence and no comorbid anxiety, affective or drug use disorders);

The "comorbid alcohol disorder" group - respondents with either DSM-IV alcohol abuse or dependence and at least one comorbid anxiety, affective or drug use disorder

The "other disorder" group - respondents with at least one anxiety affective or drug use disorder but without DSM-IV alcohol abuse or dependence

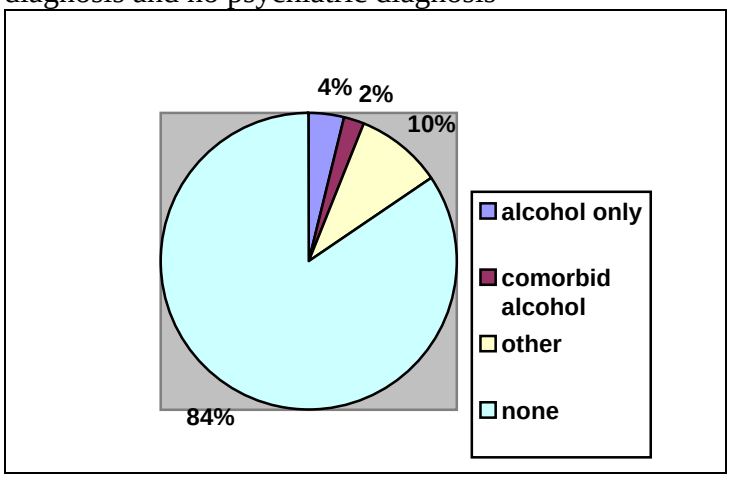
The "no disorder" group - respondents who had no anxiety, affective, drug or alcohol use disorder as measured by the survey.

Univariate analysis

3.2.1 Distribution of groups

As demonstrated in Figure 2, the majority of respondents did not meet criteria for a mental disorder in the last 12 months (84%), 10% met criteria for a mental disorder other than an alcohol use disorder, 4% met criteria for an alcohol use disorder only and 2% for an alcohol use disorder and at least one other anxiety, affective or drug use disorder.

Figure 2
Percentage of respondents in each group; pure alcohol, comorbid alcohol, other diagnosis and no psychiatric diagnosis



3.2.2 Gender and age

There was a significant relationship between gender and group ($X^{2=}$136.0 df=3;p<0.001). As shown in Figure 3, alcohol use disorders (both in the pure and comorbid alcohol groups) are primarily disorders of men (76% male in the pure alcohol group and 69% in the comorbid alcohol group). By contrast, the other disorder group was primarily female (61%) whilst the no disorder group was more evenly split (51% female). There was also a significant relationship between age and group (X^2=447.4; df=6; p<0.001). Figure 4 shows that both the alcohol groups were younger than the other two groups (46% of the pure group and 52% of the comorbid alcohol group were aged between 18 and 29 years old in comparison to 31% of the other and 22% of the no disorder groups).

Figure 3
Relationship between group and gender

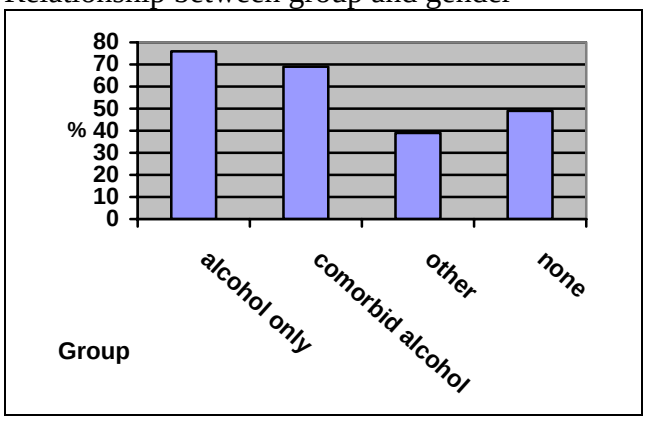
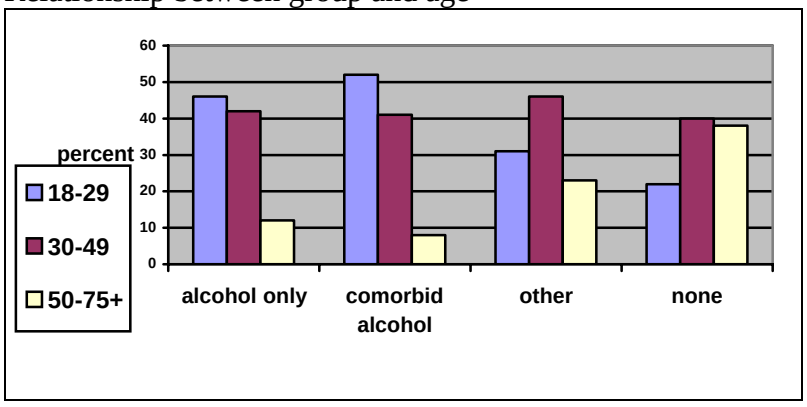


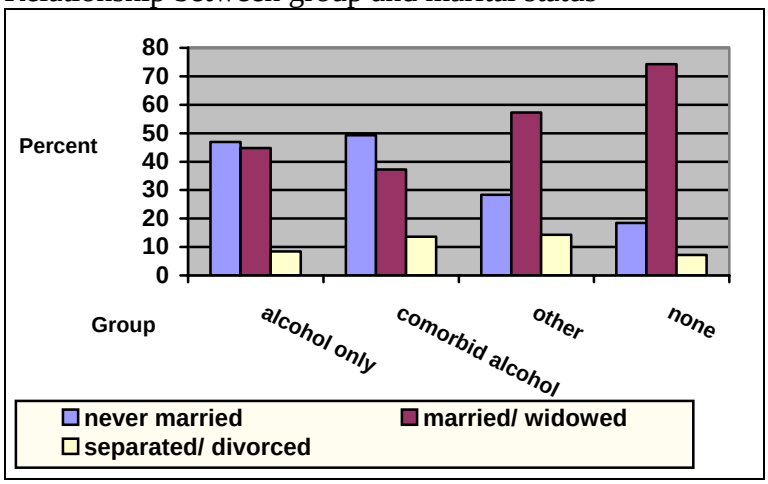
Figure 4
Relationship between group and age



3.2.3 Marital status

There was a significant relationship between group and marital status (X^2=324.8; df=6; p<0.001). Figure 5 shows that the comorbid alcohol group were the most likely of all the four groups to have never been married (49%). The comorbid alcohol group were nearly twice as likely as the pure alcohol group to have been separated or divorced (14% versus 8%).

Figure 5
Relationship between group and marital status



3.2.4 Level of schooling and employment status

There was a significant relationship between level of education attained and group (X^2=10.7;df=3;p=.03). Individuals in the other disorder group were the least likely (40%) to have completed secondary school (see Figure 6). There was also a significant relationship between employment and group (X^2=44.3;df=3;p<.001.). As shown in Figure 7 the comorbid alcohol group was most likely of the four groups to be unemployed or not in the labour force (17%). The comorbid alcohol group were more than twice as likely to be unemployed or not in the labour force than the pure alcohol group (7%).

Figure 6
Relationship between completion of secondary school and group

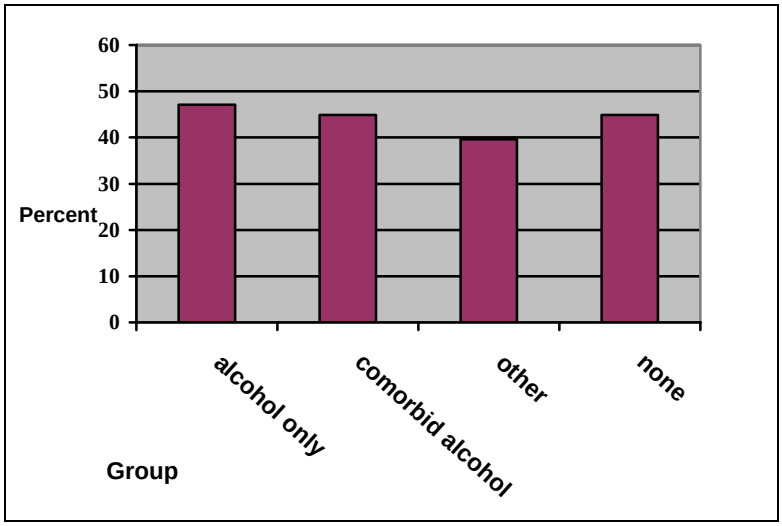
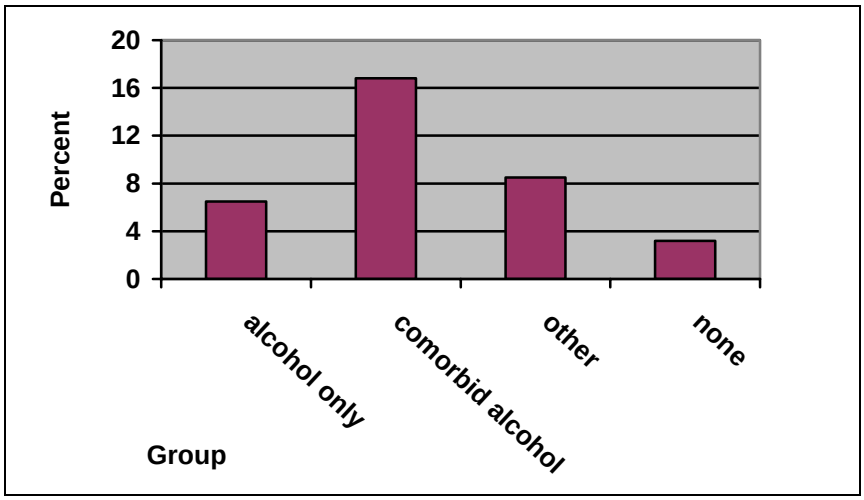


Figure 7
Relationship between unemployment and group



3.2.5 Physical illness

Respondents were presented with a list of physical conditions that usually last for some time and asked whether they currently had any of these problems. The list contained the following conditions; asthma, chronic bronchitis, anaemia, high blood pressure, heart trouble, arthritis, kidney disease, diabetes, cancer, stomach or duodenal ulcer, chronic gallbladder or liver trouble or hernia or rupture.

Figure 8
Relationship between having at least one physical illness and group

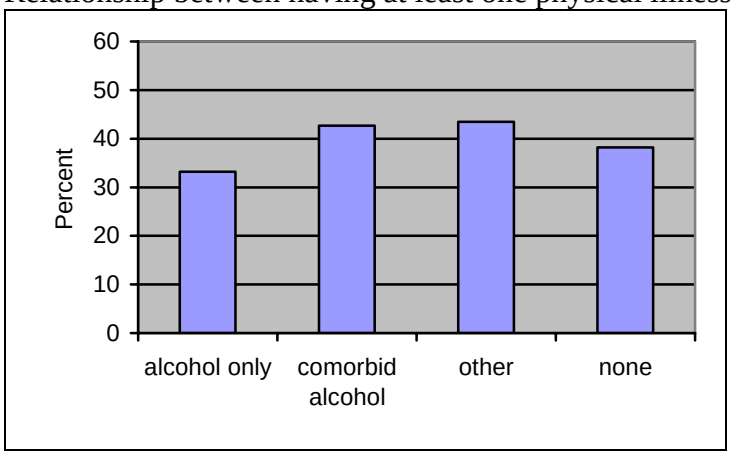


Figure 8 shows the proportion or respondents in each group who had at least one of these physical illness. There was not a statistically significant relationship between alcohol, mental disorders and physical illness (X^2=6.9; df=3; p>0.05). The comorbid alcohol group were, however, more likely to have at least one symptom than respondents in the pure alcohol group (33% versus 43%).

Multivariate analysis:

Multinomial logistic regression was used to develop a final model to identify correlates significantly associated with group membership after controlling for each of the other correlates (X^2=1003.5;df=21;p<.001). The no disorder group was used as the referent category. The final model is fully presented in Appendix 3.

Compared with respondents in the no disorder group, respondents in the pure alcohol group were 3 times as likely to be male (OR=3.0) and to be younger (18-29 years: OR=5.9; 30-49 years: OR=4.0). They were also more likely to be in an unstable relationship (i.e. not married, defacto or widowed) (OR=2.3), more likely not to have completed secondary school (OR=1.5) and more likely to have at least one physical illness (OR=1.3). They were also more likely to be unemployed (OR=1.2).

The pattern was similar for the comorbid alcohol group. They were also more likely to be male than the no disorder group (OR=2.1) and younger (18-29 years: OR=9.7; 30-49 years: OR=6.0). They were also more likely to be in an unstable relationship (i.e. not married, defacto or widowed (OR=3.4), not to have completed secondary school (OR=1.4) and more likely to have at least one physical illness (OR=2.5). They were more than three times as likely to be unemployed (OR=3.3).

3.2.6 Respondents with an alcohol use disorder

The previous analysis has looked at correlates of alcohol related comorbidity in the Australian population. It is also of interest to look at correlates in respondents with an alcohol use disorder. A binary logistic regression was undertaken to assess which of these variables predicted whether a respondent was in the pure or comorbid alcohol groups. Included in the model were age, gender, marital status, employment and education. The pure alcohol group is used as the referent category. As it has been previously proposed that respondents with an alcohol use disorder may have a more severe disorder, also included was whether a respondent had a low (up to 5) or high (more than 5) number of symptoms of alcohol dependence. As with the multinomial logistic regression, the test for each effect is based on the change in the value of –2 log-likelihood if the effect is removed from the final model

Table 7
Odds ratios and 95% confidence intervals in the population of respondents with an alcohol use disorder[1] (i.e. respondents in the comorbid alcohol and pure alcohol groups)

Variable	OR	95% CI
Gender		
Base: Male		
Female	1.5	0.82, 2.63
Age		
Base: 55+		
18-29 (Check)	2.3	0.7, 8.0
30 –54	1.7	0.5, 5.4
Employment		
Base: Employed/ Not in labour force		
Unemployed	1.25	0.9, 8.0
Schooling		
Base: Completed secondary school		
Not completed secondary school	1.1	0.7, 1.7
Marital status		
Base: Married/ defacto		
Never married	0.9	0.3, 2.6
Separated/ divorced	1.8	0.9, 3.9
Number of Criteria of alcohol dependence		
Base: 5 or less criteria		
More than five criteria	13.5	5.4, 33.8

[1] All odds ratios use the pure alcohol group as the referent category

Overall the model was significant (Wald F=9.32, df=9, p<0.001). After controlling for all the other correlates the only variable found to be significantly associated with group membership was whether the respondents had a low or high number of alcohol dependence criteria (Wald=33.63; df=1; p<0.001). As shown in Table 7 the odds of having more than five dependence criteria was fourteen times higher in the comorbid alcohol group, relative to the pure alcohol group.

Other correlates

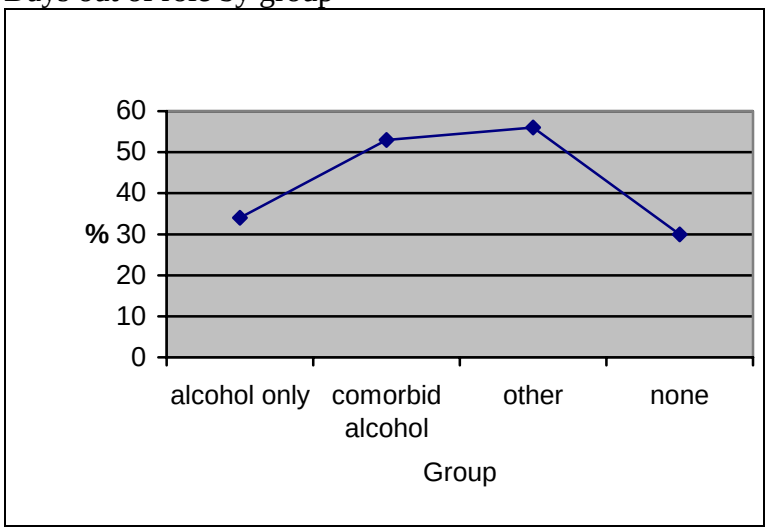
3.2.7 Days out of role

The number of days out of role in the four weeks prior to interview was assessed in the NSMH&WB. Specifically, respondents were asked about,

- The number of days when they were totally unable to work or carry out normal activities and,
- The number of days when they had to cut down on what they did, or did not get as much done as usual.

These two numbers were summed to give a variable measuring the number of partial or full days taken out of role in the previous four weeks.

Figure 9
Days out of role by group



Univariate analysis
There was a significant relationship between group and days out of role (X^2=239.0; df=3;p<.001. As shown in Figure 9, respondents with a pure alcohol use disorder were only slightly more likely to experience at least one full or partial day out of role than those with no disorder (34% vs 30%). However, individuals in the comorbid alcohol group were more likely to experience at least one full or partial day out of role (53%) than those with a pure alcohol use disorder (34%).

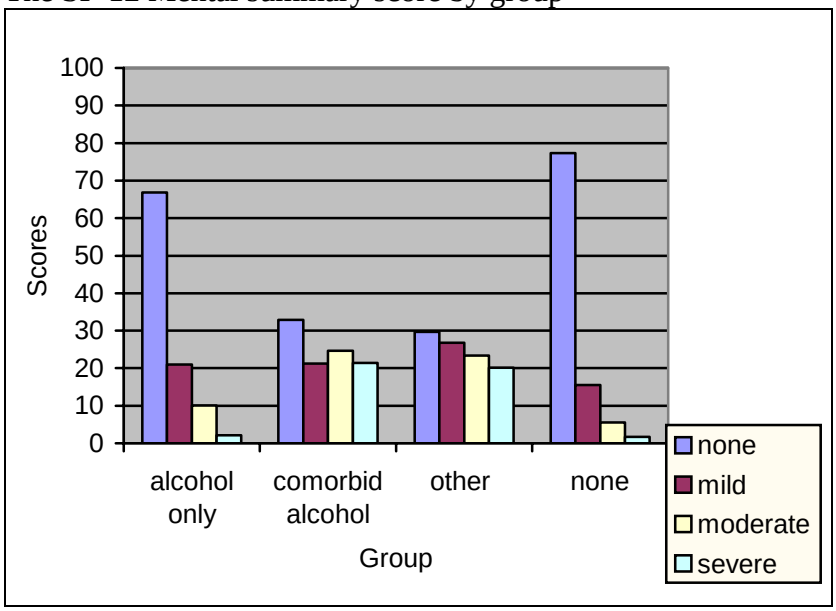
Crude and adjusted odds ratios between days out of role and group were calculated using logistic regression. Respondents with no disorder were used as the base category. Relative to individuals with no disorder those in the pure alcohol group were 1.2 (0.93, 1.51) as likely, those in the comorbid alcohol group 2.7 (2.0, 3.6) times more likely, and those in the other disorder group 3.0 (2.6, 3.5) times as likely to have taken at least one partial or full day out of role in the previous four weeks.

Multivariate analysis
After adjusting for gender, age, marital status, schooling and employment status these odds ratios changed to 1.4 (1.1, 1.7) for the pure alcohol group, 3.1 (2.3, 4.2) for the comorbid alcohol group and 3.0 (2.6, 3.5) for the other disorder group. This shows the comorbid alcohol group was more similar to the other disorder group than to the pure alcohol group with respect to days out of role (Appendix 2).

3.2.8 Short Form – 12 Mental summary score
As outlined previously, the SF-12 contains 12 questions and is a standard international instrument that provides a general measure of health status. It may also be considered a measure of disability because it addresses physical and mental limitations. The SF – 12 mental health score is scored as a continuous variable but cut-offs have been established to determine degree of disability. A score of less than 30 is rated as

severely disabled, 30-39 as moderately disabled, 40-49 as mildly disabled and 50 and over as not disabled (pers comm., CRUFAD, 2000).

Figure 10
The SF-12 Mental summary score by group

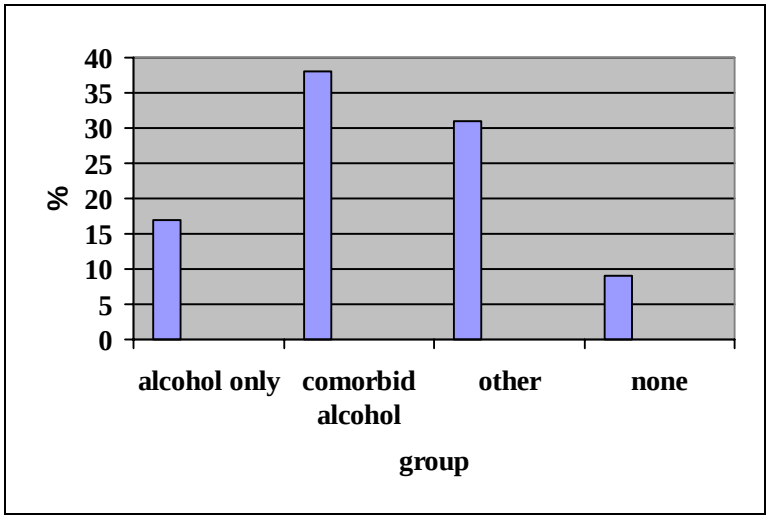


Univariate analysis
There was a statistically significant relationship between group and mental health or functioning scores on the SF-12 (X^2=538.8; df=9; p<0.001). As shown in Figure 10 respondents in the comorbid alcohol group were approximately twice as likely to be disabled to any degree as respondents in the pure alcohol group (67% or respondents in the pure alcohol and 33% of respondents in the comorbid alcohol group were not disabled). Relative to individuals with no illness those in the pure alcohol group were 1.7 (1.3, 2.2) as likely, those in the comorbid alcohol group 6.9 times (5.0, 9.7) as likely and those in the other group 8.1 times (6.8, 9.5) as likely to have a score less than 50 (i.e. be disabled).

Multivariate analysis
After adjusting for gender, age, schooling, marital status and employment status these odds ratios changed to 1.7 (1.3, 2.2) for the pure alcohol group, 6.5 (4.5, 9.4) for the comorbid alcohol group and 7.3 (6.2, 8.7) for the other disorder group. As with days out of role, the comorbid alcohol group was found to be more similar to the other disorder group than those in the pure alcohol group with respect to SF-12 mental scores (Appendix 2).

3.2.9 Suicidal behaviour
A dichotomous variable was created to measure suicidal behaviour. Respondents were scored as ever or not ever having any suicidal behaviour or (i.e. ever having contemplated or attempted suicide).

Figure 11
Relationship between suicidal behaviour and group

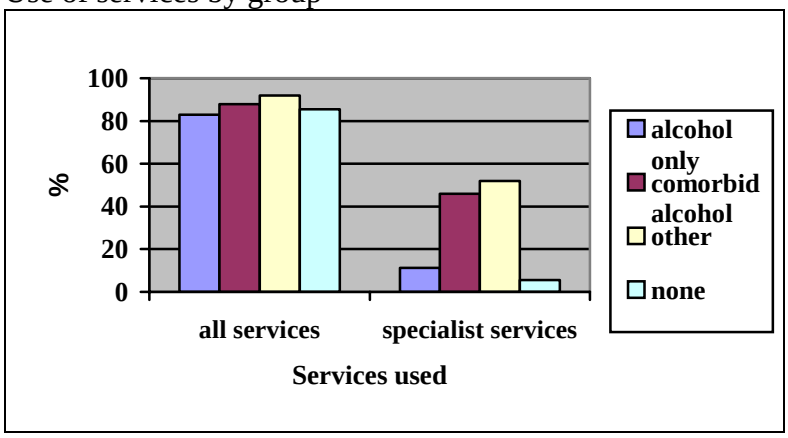


Univariate analysis
There was a statistically significant association between group and suicidal behaviour (X^2=223.3; df=3; p<.001). As shown in Figure 11, respondents in the comorbid alcohol group were the most likely of the four groups to have displayed some level of suicidal behaviour (38% had contemplated or attempted suicide). Relative to individuals with no disorder those in the pure alcohol group were 1.9 (1.3, 3.0) as likely, those in the comorbid alcohol group 5.9 (4.4, 8.0) as likely and those in the other group 4.3 (3.5, 5.3) times as likely to have ever engaged in some suicidal behaviour.

Multivariate analysis
After adjusting for gender, age, marital status, schooling and employment status these odds ratios changed to 2.1 (1.3, 3.3) for the pure alcohol group, 6.0 (4.2, 8.7) for the comorbid alcohol group and 3.7 (3.0, 4.6) for the other disorder group. The comorbid alcohol group was therefore the most likely of the four groups to have ever exhibited some suicidal behaviour (Appendix 2).

3.2.10 Use of health services
Two dichotomous variables were created to measure use of health services; use of generalist health professionals and use of services for mental problems. Use of generalist services was measured as the number of visits made to any health professional in the past twelve months for respondents own health. Use of services for mental problems was measured as the number visits made to health professionals in the past twelve months for mental problems such as stress, anxiety, depression, or dependence on drugs or alcohol. Dichotomous variables were scored as no visits or one or more visits.

Figure 12
Use of services by group



Univariate analysis

There was a significant association between consultation with a generalist health professional and group (X^2=27.4 df=3 p<.001). Figure 12 demonstrates that individuals in the pure alcohol group were slightly less likely than those in the comorbid alcohol group to have seen any health professional in the previous twelve months (83% versus 88%). Individuals who suffered a mental disorder, other than an alcohol use disorder, were the most likely to have seen a generalist health professional (92%).

There was also a significant relationship between the use of specialist services and group (X^2=758.5;df=3;p<0.001). As would be expected, the group with no mental disorders consulted these professionals least (6%). Those with a pure alcohol use disorder were the next least likely of the groups to have seen a specialist health professional (11%). This is considerably less than the other two disorder groups, where approximately half the respondents in each group had seen a professional for their mental problems (46% of those with a comorbid alcohol use disorder and 52% of those in the other disorder group).

Odds ratios were used to assess the strength of the relationship between group membership and use of mental health services. The no illness group was used as the base category. As it is particularly useful to look at use of services by those who could be classified as "in need of services" this analysis was undertaken on the sub population of respondents who had an SF-12 score of less than 50, that is, were classified as disabled according to this survey instrument. The crude odds ratios for use of mental health services were 2.2 (1.3, 3.7) for the pure alcohol group, 8.2 (4.9, 13.8) for the comorbid alcohol group and 8.4 (6.5, 10.8) for the other disorder group.

Multivariate analysis

After adjusting for gender, age, employment, schooling and marital status the odds ratios were 3.0 (1.5, 5.8) for the pure alcohol group, 11.6 (5.8, 23.0) for the comorbid alcohol group and 9.0 (7.1, 11.4) for the other disorder group. As with the other outcome measures, patterns of service utilisation by the comorbid alcohol group are more like those of the other disorder than the pure alcohol group (Appendix 2).

3.2.11 Summary

The aim of Section Two was to determine the correlates of alcohol related comorbidity in the general population. In comparison to the rest of the population, respondents in both the alcohol groups were more likely to be male and younger. They were also less likely to be in a stable relationship. The comorbid alcohol group was most likely to be unemployed. However, the only factor to significantly differentiate between the two alcohol groups was the number of symptoms of alcohol dependence. Respondents in the comorbid alcohol group were fourteen times more likely to have more than five symptoms. The comorbid alcohol group were also more likely to have taken days out of role, to be more severely disabled, to have exhibited more suicide related behaviour and to have seen a health professional for their mental problems than those in the pure alcohol group. They were the most likely of all groups to have exhibited some form of suicidal behaviour.

Section 3
Factor structure of alcohol dependence : alcohol use disorders and mental disorders

3.3.1 Quantity and frequency of alcohol consumption

The data on quantity of alcohol consumption was found to be skewed to the right (i.e. most respondents consumed a small number of drinks) so non-parametric statistics were used (Kruskal-Wallis test for independent samples) to assess significance. There was a statistically significant difference between the groups on the median number of drinks consumed (X^2=894.8; df=3; p<0.001). As demonstrated in Figure 13 those in the comorbid alcohol group consumed a slightly higher median number of drinks (6) than those in the pure alcohol group (5). Respondents in the other disorder and in the no disorder groups consumed a median of two drinks on an average drinking occasion. Figure 14 shows frequency of alcohol consumption. As expected, individuals in the two alcohol groups (pure and comorbid) were drinking on a more frequent basis than respondents in the other two groups. Although no distinct pattern emerged between the two alcohol groups, respondents in the pure alcohol group were more likely to consume alcohol on a daily basis than those in the comorbid alcohol group (47% versus 41%).

Figure 13
Median number of drinks consumed on an average drinking occasion by group

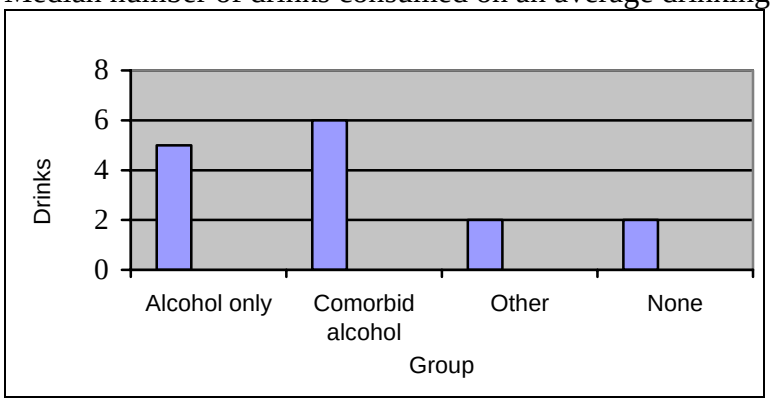
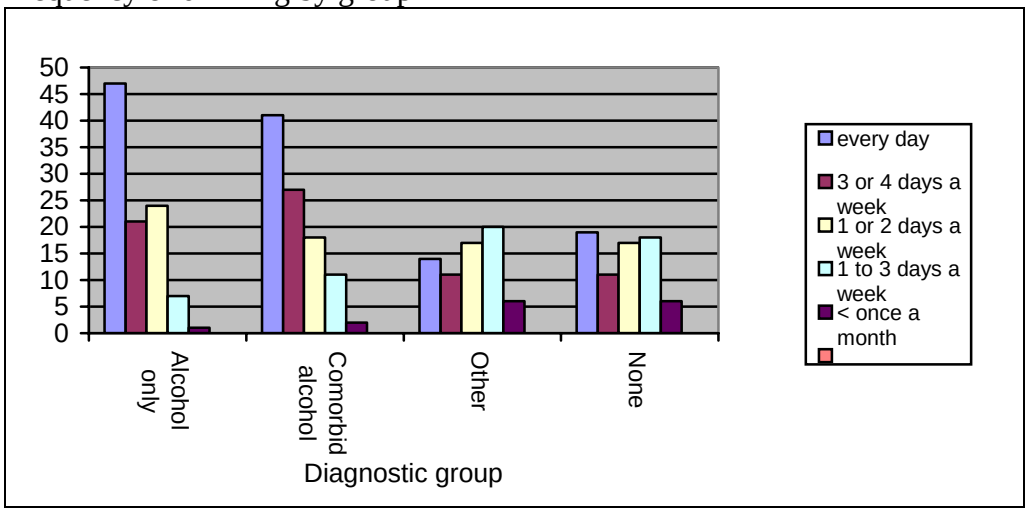


Figure 14
Frequency of drinking by group



3.3.2 Type of diagnosis, number and nature of dependence symptoms

The essential feature of DSM-IV alcohol dependence is a clustering of cognitive, behavioural., and physiological symptoms indicating that an individual continues use of alcohol despite significant alcohol related problems. There is a pattern of repeated self-administration of alcohol that usually results in tolerance, withdrawal and compulsive drug-taking behaviour. DSM-IV symptom 1 of alcohol dependence is indicative of tolerance, symptom 2 of withdrawal and symptoms 3 – 7 of compulsive alcohol related behaviour. Alcohol dependence is defined as a cluster of three or more of these symptoms occurring at any time in the same twelve-month period.

The median number of dependence criteria was 3 in the pure alcohol group and 4 in the comorbid alcohol group (X^2=30.3; df=1; p<0.001). Figure 15 shows the pure alcohol group were more likely to have a lower number of symptoms (between 3 and 5) and the comorbid alcohol group more likely to have higher number of symptoms (between 6 and 7) of alcohol dependence. Significantly more respondents in the comorbid alcohol group had a diagnosis of alcohol dependence than alcohol abuse (82% in the comorbid alcohol group and 61% in the pure alcohol group; X^2=21.7; df=1; p<0.001).

Figure 15
Number of alcohol dependence symptoms by group

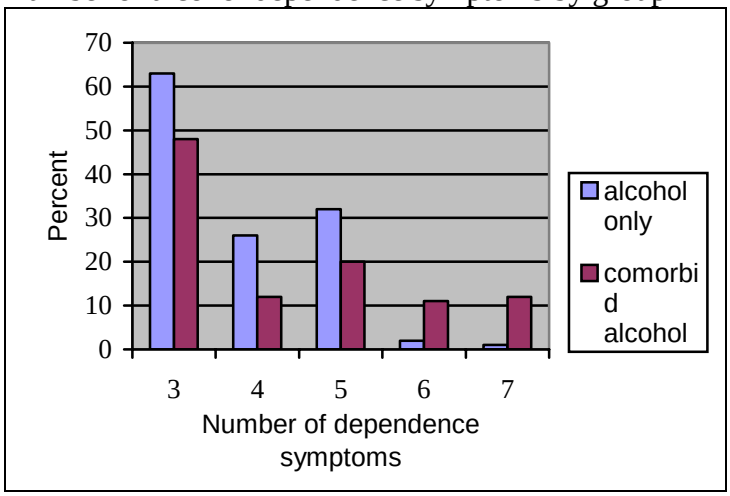


Table 6 shows the prevalence of symptoms of alcohol dependence in the pure alcohol and comorbid alcohol groups. The most frequently cited symptoms for each group were; the drug is often taken in larger amounts or over a longer period than was intended (symptom 3), followed by a persistent desire or unsuccessful efforts to cut down (symptom 4) and tolerance (symptom 1).

Table 8
Prevalence and standard errors of alcohol dependence symptoms by group

Symptom	Alcohol only	Comorbid alcohol	X^2	df	p
1. Tolerance	74.4 (3.3)	68.5 (4.6)	0.9	1	0.35
2. Withdrawal	33.6 (8.0)	55.4 (7.4)	1.26	1	0.27
3. Drug in larger amounts or over longer time than was intended	90.6 (4.3)	96.0 (2.1)	1.64	1	0.21
4. Persistent desire or unsuccessful efforts to cut down or control use	83.4 (8.5)	83.0 (7.0)	0.01	1	0.91
5. Great deal of time trying to obtain alcohol, use it or recover from it	26.7 (3.4)	48.3 (4.1)	20.0	1	<0.001
6. Important social occupational or recreational activities given up or reduced because of alcohol	5.7 (1.7)	29.7 (3.8)	31.0	1	<0.001
7. Drug used despite knowledge of having persistent physical or psychological problems likely to be caused or exacerbated by alcohol	42.5 (7.7)	56.9 (4.6)	6.05	1	0.01

There were statistically significant differences between the groups on the prevalence of symptoms 5 (X^2=20.0; df=1; p<0.001), symptom 6 (X^2=31.0; df=1; p<0.001), and symptom 7 (X^2=6.05; df=1; p=0.01). Respondents in the comorbid alcohol group were more likely to be positive on symptoms indicative of chronic alcohol use; spending more time to get alcohol (symptom 5), giving up social or recreational pursuits because of alcohol (symptom 6) and using alcohol despite the knowledge it may be giving you harm (symptom 7).

3.3.3 Structure of alcohol dependence

This section of the report explores the underlying structure of alcohol dependence in respondents with and without at least one comorbid anxiety, affective or drug use disorder. The analysis involved Principal Components Analysis (PCA) to reduce the data. The PCA was performed firstly, on respondents who had consumed more than 12 drinks in the previous 12 months (i.e. were current consumers of alcohol), and then in the population of heavy drinkers (i.e. who consumed more than six standard drinks on an average drinking occasion). A cut-off of six drinks was chosen to be consistent with NH&MRC guidelines for heavy drinking by men.

3.3.4 In the population of all drinkers - Pure alcohol group

Respondents were selected for analysis where they had consumed more than twelve alcoholic drinks in the previous 12 months and they were negative for all anxiety, affective and drug use disorders.

The PCA for the pure alcohol group produced a two component solution (Eigenvalue for component one was 2.24 and for component 2 was 1.03). These two factors

explained 47% of the variance (Appendix 4). Table 9 presents the rotated component matrix. This table shows symptoms loading on the first component to be symptom 1 (tolerance), symptom 3 (needing larger amounts of alcohol, being unsuccessful at cutting down), symptom 4 (using alcohol despite having problems) and symptom 7 (use of alcohol is continued despite problems). The second component loaded on symptom 2 (tolerance), symptom 5 (spending a large amount of time in activities to obtain alcohol and giving up activities for alcohol) and symptom 6 (giving up or reducing important social., occupation or recreational activities because of alcohol).

Table 9
Factor Loadings in the Alcohol Only Group – n=6692

	Component	
DSM-IV symptoms	1	2
(1) Tolerance to alcohol	.707	-.103
(2) >2 withdrawal symptoms or other substance taken to alleviate withdrawal	.211	.474
(3) The drug is taken in larger amounts or over a longer time than was intended	.741	.009
(4) There is a persistent desire or unsuccessful efforts to cut down or control drug use	.666	.056
(5) A great deal of time is spent in activities necessary to obtain the drug, use the drug, or recover from its effects	.161	.601
(6) Important social., occupational., or recreational activities are given up or reduced because of alcohol	-.249	.858
(7) The drug use is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by the drug	.405	.304
% of variance explained	31.9%	14.8%

3.3.5 In the population of all drinkers – Comorbid alcohol group

Respondents were selected for analysis if they had consumed more than twelve alcoholic drinks in the previous 12 months and they were positive for at least one anxiety, affective or drug use disorder. The PCA produced a one-factor solution (Eigenvalue 3.50) that accounted for 50% of the variance (Appendix 4). The factor loadings are presented in Table 10.

Table 10
Factor Loadings in the Comorbid Alcohol Group n=1014

DSM-IV symptoms	Component
(1) Tolerance to alcohol	.657
(2) >2 withdrawal symptoms or other substance taken to alleviate withdrawal	.699
(3) The drug is taken in larger amounts or over a longer time than was intended	.729
(4) There is a persistent desire or unsuccessful efforts to cut down or control drug use	.715
(5) A great deal of time is spent in activities necessary to obtain the drug, use the drug, or recover from its effects	.742
(6) Important social., occupational., or recreational activities are given up or reduced because of alcohol	.709
(7) The drug use is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by the drug	.696
% of variance explained	50.0%

3.3.6 In the population of heavy drinkers – Pure alcohol only group

Respondents were selected for this analysis if they consumed more than six drinks on an average drinking occasion and they were negative for all other anxiety, affective and drug use disorders. The PCA for the pure alcohol group produced a two factor solution explaining 48% of the variance (Appendix 4). The rotated factor solution is demonstrated in Table 11.

Table 11
Factor Loadings in the Pure Alcohol Group n=445

	Component	
DSM-IV symptoms	1	2
(1) Tolerance to alcohol	.048	.753
(2) >2 withdrawal symptoms or other substance taken to alleviate withdrawal	.634	.064
(3) The drug is taken in larger amounts or over a longer time than was intended	.173	.712
(4) There is a persistent desire or unsuccessful efforts to cut down or control drug use	.613	.059
(5) A great deal of time is spent in activities necessary to obtain the drug, use the drug, or recover from its effects	.491	.302
(6) Important social., occupational., or recreational activities are given up or reduced because of alcohol	.779	-.360
(7) The drug use is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by the drug	.568	.131
% of variance explained	32.2%	15.6%

Symptoms loading on the first factor were on symptom 2 (having withdrawal symptoms), symptom 4 (unsuccessful at cutting down alcohol), symptom 5 (spending a large amount of time trying to obtain alcohol), symptom 6 (giving up activities because of alcohol) and symptom 7 (using alcohol despite knowledge of problems). The second factor consisted of symptom 1 (tolerance) and symptom 3 (drinking larger amounts of alcohol).

3.3.7 In the population of heavy drinkers - Comorbid alcohol group

Respondents were included in this analysis if they consumed more than six drinks on an average drinking occasion and they were positive for at least one anxiety, affective or drug use disorder. As with the analysis in the population of all drinkers with a comorbid mental disorder, the PCA for this group produced a one-factor solution (Table 12) explaining 50% of the variance (Appendix 4).

Table 12
Factor Loadings in the Comorbid Alcohol Group n=147

DSM-IV symptoms	Component
(1) Tolerance to alcohol	.579
(2) >2 withdrawal symptoms or other substance taken to alleviate withdrawal	.761
(3) The drug is taken in larger amounts or over a longer time than was intended	.693
(4) There is a persistent desire or unsuccessful efforts to cut down or control drug use	.656
(5) A great deal of time is spent in activities necessary to obtain the drug, use the drug, or recover from its effects	.767
(6) Important social., occupational., or recreational activities are given up or reduced because of alcohol	.810
(7) The drug use is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by the drug	.649

3.3.8 Summary

With respect to quantity and frequency of alcohol consumption, there was only a slight difference in the median number of drinks consumed in the two alcohol groups. Furthermore, frequency of consumption did not differ markedly. As expected, both the alcohol groups drank more alcohol on average and drank more frequently than the other disorder and no disorder group. Respondents in the comorbid alcohol group had a higher number of symptoms of alcohol dependence and were more likely to have a diagnosis of alcohol dependence than those in the pure alcohol group.

The structure of alcohol dependence differed between the two groups. Respondents in the comorbid alcohol group were more likely to be positive on symptoms that indicated chronic involvement with alcohol. These symptoms were spending more time to get alcohol, giving up social or recreational pursuits because of alcohol and using alcohol despite the knowledge it may be giving you harm. The Principal Components Analysis confirmed this difference. When looking at the population of comorbid drinkers (i.e. those who consumed more than 12 drinks in the previous year) the dependence symptoms formed a uni-dimensional syndrome. However, in the

population of drinkers without a comorbid disorder, the syndrome split into two components.

4.0 Discussion

4.1 Prevalence of comorbidity : Alcohol use disorders and mental disorders

In the Australian adult population alcohol related comorbidity was widespread. More than one-third (37%) of respondents with an alcohol use disorder had at least one comorbid anxiety, affective or drug use disorder and one-fifth had three or more mental disorders. As with findings from the US, the odds are highest for other drug use disorders (Reiger et al., 1990). Although, the association was strongest for the drug disorders, depression was the most prevalent of the specific mental disorders. This replicates previous US research (Kessler et al., 1996).

Respondents with an alcohol disorder were approximately three times as likely to have either an affective or anxiety disorder. Table 13 shows that, although the odds of comorbidity with specific mental disorders was similar in the Australian and the US populations, the odds of panic disorder and post-traumatic stress disorders were higher. These differences may reflect the lower drinking age and easier access to alcohol in Australia, as well as the culturally legitimate role that alcohol plays in dealing with anxiety provoking situations.

Table 13
Comparing odds ratios between alcohol dependence and mental disorders in Australia and the US

	Australia (NSMH&WB)	US (NCS)
Affective		
Major depressive episode	4.6	3.7
Dysthymia	4.6	3.9
Mania	-	10.8
Bipolar	6.3	-
Anxiety		
Generalised anxiety disorder	4.4	4.6
Panic disorder	**5.3**	**1.7**
Agoraphobia	3.4	2.6
Social phobia	4.9	2.8
Post traumatic stress disorder	**7.0**	**2.2**

Source for US data: Kessler et al., The epidemiology of co-occurring addictive and mental disorders: Implications for prevention and service utilisation. American Journal of Orthopsychiatry, January, 1996.

4.2 Correlates : Alcohol use disorders and mental disorders

Kessler et al (1994) found that respondents with three or more disorders were more likely to be female, younger, living in a metropolitan area, to have completed less years of secondary schooling and were more likely to be in a lower income bracket (Kessler et al., 1994). Our research had similar findings. In comparison to the pure alcohol group the comorbid alcohol group were slightly more likely to be female, younger and unemployed. Analysis of consumption patterns showed that there was only a slight difference in the median number of drinks consumed between the two groups nor did the frequency of consumption markedly differ. Respondents in the comorbid alcohol group were, however, fourteen times more likely to have a higher

number of symptoms (five or more) of alcohol dependence compared to those without a comorbid mental disorder. This supports previous findings that comorbidity is associated with a more serious and chronic alcohol disorder (Kessler, 1995; Wittchen, 1996).

Despite the fact that respondents in the two alcohol groups were similar in their demographic profiles and patterns of alcohol consumption, they differed on several correlates. The comorbid alcohol group were more likely to have taken days out of role and to be more severely disabled with respect to their mental health than those without a comorbid mental disorder. This concurs with previous research that has shown comorbidity leads to an increase in general disability, a more severe illness course and poorer treatment outcomes (Lehman et al., 1993; Drake et al., 1996; Hesselbrock, 1991).

Also confirmed is the link between alcohol use disorders and suicidal behaviour. The ECA has shown a strong positive relationship between depression, active alcohol use disorders and suicide attempts (Petronis et al., 1990). Respondents who contemplated suicide were significantly more likely to have an alcohol use disorder and depression in the previous year compared to those who did not contemplate suicide (Grant & Hasin, 1999). Our analysis of the NSMH&WB showed that, after adjusting for demographic variables, respondents in the comorbid alcohol group were the most likely of all the group to have exhibited some suicidal behaviour and were six times as likely to have exhibited some of this behaviour than those in the no disorder group.

Research from the NCS and the ECA has shown that comorbidity increases treatment seeking and that respondents with comorbid mental disorders were more likely to use specialist treatment services (Kessler, 1995). In the ECA data, respondents with an alcohol use disorder in specialist treatment services were nearly four times as likely to have a comorbid mental disorder compared to respondents not in treatment (Reiger et al., 1990). Our findings were similar. Respondents in the comorbid alcohol group were approximately four times as likely to use specialist health services than respondents with an alcohol disorder but no comorbid mental disorders.

4.3 Factor structure of alcohol dependence : Alcohol use disorders and mental disorders

The factor structure of alcohol dependence differed in the two alcohol groups. Respondents in the comorbid alcohol group were more likely to be positive on symptoms indicating chronic involvement with alcohol. These symptoms were spending more time to get alcohol, giving up social or recreational pursuits because of alcohol and using alcohol despite the knowledge it may be doing you harm.

The preliminary Principal Components Analysis we conducted confirmed this difference. When looking at the population of comorbid drinkers (i.e. those who consumed more than 12 drinks in the previous year and had at least one comorbid mental disorder) the dependence symptoms formed a uni-dimensional syndrome. However, in the population of drinkers without a comorbid disorder, the syndrome split into two components. This finding adds strength to the proposition put forward by researchers such as Caetano (1990; 1999) and Muthen, (1993) who have suggested that the factor structure of alcohol dependence may differ according the sub-groups in the population. Previous research has suggested cultural and gender differences. Our

findings suggest that comorbidity with mental disorders may also be an important method of sub-grouping and that future research should further examine the relevance of particular DSM-IV criteria for those with and without this type of comorbidity. The next planned stage of this research will be to undertake further analysis of the factor structure of alcohol dependence using techniques which account for the dichotomous nature of the data (Muthen, 1993; 1995).

4.4 Summary

In sum, all mental disorders are more common in respondents with alcohol use disorders. In particular, they are more likely to have other drug use disorder. They were also more likely to seek specialist treatment that those without these added disorders. Despite this increased use of services, these respondents also had poorer life outcomes such as more days taken out of role, increased disability and more suicidal behaviour.

There was little difference in the demographic profiles and drinking habits of respondents with and without comorbid mental disorders. Respondents with comorbid mental disorders did appear however, to have a more chronic and disabling type of alcohol disorder. Results of the factor analysis of alcohol dependence confirmed this by showing different factor solutions in the two groups. Future research should examine, in more detail, the nature of alcohol dependence in this sub-group of individuals in an attempt to identify more appropriate and effective initiatives in both prevention and treatment. This will lead, in turn, to a reduction in the burden of illness both for the individual and for society as whole.

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APPENDIX 1
Variable coding

Group variable (1=pure alcohol group, 2=comorbid alcohol group; 3=other mental disorder group and 4=no mental disorder group)

Gender (1=male, 2=female)

Age (1=18-29; 2=30-49; 3=50+)

Marital status (1=never married; 2=married/ widowed/ defacto; 3=separated/ divorced)

Employment status (1=unemployed; 2=employed or not in labourforce)

Education (1=did not complete secondary school; 2=completed secondary school)

Number of medical conditions (continuous 0-12; coded 1=none; 2=>1 disorder) Presence or absence of following medical conditions; asthma; chronic bronchitis; anaemia; high blood pressure; heart trouble; arthritis; kidney disease; diabetes; cancer; stomach or duodenal ulcer; chronic gall bladder or liver trouble; hernia or rupture.

Days out of role (1=no partial or full days out of role in the previous month; 2=more than one full or partial day taken in the previous four weeks)

Days out of role were measured by the addition of the responses to the questions ’Beginning yesterday and going back 4 weeks, how many days out of the past 4 weeks were you totally unable to work or carry out your normal activities because of your health’ and

‘Apart from (that day/ those days nominated in the previous question, how many days in the past 4 weeks were you able to work and carry out your normal activities, but had to cut down on what you did, or did not get as much done as usual because of your health?’

SF-12 mental score (1=<30=severe disability; 2=30<40=moderate disability; 3=40<50=mildly disabled; 4=50+=severely disabled). A dichotomous variable was created for logistic regression; 1= score < 50(disabled); = score > 50(not disabled)

The SF-12 is a standard international instrument which provides a generic measure of health status. It may also be considered a measure of disability because it addresses limitations due to mental.

Suicidal behaviour (1=never contemplated/ attempted suicide; 2=contemplated suicide; 3=ever attempted suicide; 4=attempted suicide in the previous twelve months). A dichotomous variable was also created for logistic regression (1=no suicide behaviour i.e. never contemplated/ attempted suicide; 2= suicide behaviour; i.e. has ever contemplated or attempted suicide)

Health service utilisation

Number of visits made to health professional in the past twelve months for respondents own health (1=no visits; 2= one or more visits)

Number of visits made to health professional in the past twelve months for mental problems such as stress, anxiety, depression, or dependence on drugs or alcohol

Alcohol consumption

Quantity of consumption is measured as

(1=almost every day; 2=3 or 4 days a week; 4=1 to 3 days a month; 5=less than once a month).

Quantity is measured as – on days when you drank alcohol, about how many drinks did you usually have in a single day? (Continuous measure)

APPENDIX 2

Prevalences and standard errors of groups

	Prevalence of the disorder	
Group	%	SE
Pure alcohol use disorder	3.8	0.4
Comorbid alcohol and mental disorders	2.2	0.2
Other psychiatric disorders only	9.5	0.4
No psychiatric disorder	84.4	0.5

Demographic prevalences and standard errors of the sample by group

	Pure alcohol	**Comorbid alcohol**	**Other psychiatric disorder**	**No disorder**
Age				
(se)				
18-29	46.3 (5.4)	51.8 (4.1)	31.3 (1.8)	21.7 (0.3)
30-49	42.0 (3.5)	40.5 (3.5)	45.6 (2.3)	40.2 (0.3)
50+	11.8 (3.1)	7.7 (2.3)	23.2 (1.2)	38.1 (0.3)
Gender				
(se)	2.3	5.5	2.5	0.5
Male	75.7	69.2	39.1	48.6
Female	24.3	30.8	60.9	51.4
Marital status				
Never married	46.8 (6.8)	49.3 (4.5)	28.4 (1.8)	18.5 (0.7)
Married/ defacto/ widowed	44.8 (5.4)	37.2 (4.8)	57.3 (2.2)	74.3 (0.6)
Separated/ divorced	8.4 (2.7)	13.6 (3.7)	14.3 (1.3)	7.2 (0.4)
Employment				
(se)	1.4	5.2	1.0	0.3
Unemployed	6.5	16.8	8.5	3.2
Employed/ Not in labour force	93.5	83.2	91.5	96.8
Education				
(se)	7.1	4.7	2.2	0.8
Completed secondary school	47.1	44.9	39.6	45.9
Not completed secondary school	52.9	55.1	60.4	54.1
Physical illness				
(se)	2.7	5.9	2.4	0.6
No illness	66.8	57.3	56.5	61.9
Some illness	33.2	42.7	43.5	38.1

Prevalences and standard errors of the number of comorbid disorders in respondents with alcohol use disorders

Number of disorders	1	2	3	4	5	6
Percent of respondents	58.3 (3.0)	2.8 (3.0)	9.1 (2.4)	5.3 (2.6)	3.6 (1.4)	1.1 (0.6)

Prevalences and standard errors of full and/ or partial days out of role by group

Group	Proportion with at leat one full or partial day out of role
Pure alcohol use disorder	33.4 (2.6)
Comorbid alcohol and mental disorders	53.0 (3.5)
Other psychiatric disorders only	56.1 (1.7)
No psychiatric disorder	29.7 (0.9)

Association between days out of role group. Crude odds ratio and odds ratio adjusted for age, gender, marital status, employment and schooling

	Crude OR	95% Confidence interval	Adjusted OR	95% Confidence interval
Pure alcohol	1.2	0.93, 1.51	1.4	1.1, 1.7
Comorbid	2.7	2.0, 3.6	3.1	2.3, 4.2
Other	3.0	2.6, 3.5	3.0	2.6, 3.5

Base category – No illness group

Prevalences and standard errors pf SF 12 - Mental Scores by group

	None (score 50+)	Mild (score 40-<50)	Moderate (score 30-<40)	Severe (score <30)
Pure alcohol	66.8 (2.7)	21.0 (4.2)	10.1 (2.5)	2.1 (0.7)
Comorbid	32.9 (3.4)	21.2 (3.7)	24.6 (4.6)	21.4 (3.0)
Other	29.7 (1.5)	26.8 (1.8)	23.4 (1.6)	20.1 (1.1)
None	77.3 (0.6)	15.5 (0.5)	5.5 (0.4)	1.7 (0.2)

Association between SF12- mental score disability and group. Crude odds ratio and odds ratio adjusted for age, gender, marital status, employment and schooling

	Crude OR	95% Confidence interval	Adjusted OR	95% Confidence interval
Pure alcohol	1.7	1.3, 2.2	1.7	(1.3, 2.2)
Comorbid	6.9	5.0, 9.7	6.5	(4.5, 9.4)
Other	8.1	6.8, 9.5	7.3	(6.2, 8.7)

Base category – No illness group
SF12- score – not disabled = score < 50; disabled = score >50

Prevalences and standard error of suicide behaviour by group

Pure alcohol	16.5 (2.6)
Comorbid alcohol group	37.7 (4.1)
Other psychiatric disorder	30.4 (1.7)
No psychiatric disorder	9.3 (0.5)

Association between suicide behaviour and group. Crude odds ratio and odds ratio adjusted for age, gender, marital status, employment and schooling

	Crude OR	95% Confidence interval	Adjusted OR	95% Confidence interval
Pure alcohol	1.9	1.3, 3.0	2.1	1.3, 3.3
Comorbid	5.9	4.4, 8.0	6.0	4.2, 8.7
Other	4.3	3.5, 5.3	3.7	3.0, 4.6

Percentage of those with mental disorders (pure alcohol use disorder, alcohol and at least one other mental disorder, other psychiatric disorders and no psychiatric disorder) who had consulted a health professional at least once in the past twelve months

	Generalist services		Subjects using specialist services	
Group	%	SE	%	SE
Pure alcohol use disorder	82.9	5.4	11.3	2.2
Comorbid alcohol and mental disorders	87.8	3.2	46.0	5.9
Other psychiatric disorders only	91.9	1.3	51.9	1.8
No psychiatric disorder	85.5	1.1	5.5	0.3

Services are defined as having seen doctor or health professional regarding your own health in the previous 12 months.

Association between use of services and group. Crude odds ratio and odds ratio adjusted for age, gender, marital status, employment and schooling

	Crude OR	95% Confidence interval	Adjusted OR	95% Confidence interval
Pure alcohol	2.2	1.3, 3.7	3.0	1.5, 5.8
Comorbid	8.2	4.9, 13.8	11.6	5.8, 23.0
Other	8.4	6.5, 10.8	9.0	7.1, 11.4

Mean number and standard errors of dependence criteria by group

Pure alcohol	2.6 (0.1)
Comorbid alcohol group	3.9 (0.2)
Other psychiatric disorder	0.3 (0.03)
No psychiatric disorder	0.2 (0.1)

APPENDIX 3

Multinomial Logistic Regression for relationship between group membership; pure alcohol, comorbid alcohol, oter disorder and no disorder group and demographic correlates

	Pure alcohol			Comorbid alcohol			Other disorder		
	β	S.E.	adjusted OR (95%CI)	β	S.E.	adjusted OR (95%CI)	β	S.E.	adjusted OR (95%CI)
Gender									
male	1.11	0.12	3.04(2.42, 3.82)	0.74	0.14	2.09(1.60, 2.73)	-0.42	0.07	0.66(0.58, 0.76)
Age									
18-29 years	1.78	0.19	5.91(4.10, 8.53)	2.28	0.25	9.74(6.00, 15.93)	0.90	0.10	2.47(2.02, 3.01)
30-49 years	1.38	0.17	3.96(2.83, 5.54)	1.80	0.24	6.00(3.77, 9.57)	0.82	0.08	2.28(1.93, 2.69)
Marital status									
Never married/ separated/ divorced	0.85	0.11	2.33(1.86, 2.92)	1.22	0.15	3.39(2.54, 4.52)	0.75	0.07	2.11(1.85, 2.42)
Schooling									
Not completed secondary school	0.39	0.11	1.47(1.18, 1.83)	0.35	0.14	1.43(1.09, 1.87)	-.38	0.07	1.46(1.28, 1.67)
Employment									
Unemployed	0.14	0.27	1.15(0.74, 1.79)	1.18	0.19	3.25(2.24, 4.72)	0.62	0.13	1.85(1.43, 2.41)
Physical health									
At least one physical illness	0.29	0.12	1.34(1.06, 1.70)	0.92	0.14	2.51(1.91, 3.30)	0.55	0.07	1.74(1.51, 2.0)

Referrent categories: gender=female, age=50+, marital status=married/defacto/widowed, schooling=not completed secondary, employed=employed/ not in labour force, physical health=no physical disorder

APPENDIX 4
Principal Components Analysis
Pure alcohol in the population of drinkers – n=6692

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	2.233	31.895	31.895	2.233	31.895	31.895	1.975
2	1.034	14.771	46.666	1.034	14.771	46.666	1.646
3	.850	12.147	58.813				
4	.811	11.585	70.398				
5	.749	10.697	81.095				
6	.704	10.056	91.152				
7	.619	8.848	100.000				

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

Comorbid alcohol in the population of drinkers – n=1014

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.500	50.000	50.000	3.500	50.000	50.000
2	.759	10.847	60.847			
3	.662	9.452	70.299			
4	.607	8.668	78.967			
5	.570	8.139	87.107			
6	.464	6.630	93.737			
7	.438	6.263	100.000			

Extraction Method: Principal Component Analysis.

Pure Alcohol in the population of heavy drinkers – n=445

Total Variance Explained

	Initial Eigenvalues			Extraction Sumsof Squared Loadings			Rotation Sumsof Squared Loadings
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	2.251	32.153	32.153	2.251	32.153	32.153	2.096
2	1.094	15.631	47.784	1.094	15.631	47.784	1.471
3	.848	12.108	59.893				
4	.794	11.344	71.236				
5	.767	10.959	82.195				
6	.675	9.644	91.839				
7	.571	8.161	100.000				

Extraction Method: Principal Component Analysis.

a When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

Comorbid alcohol in the population of heavy drinkers – n=147

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.489	49.849	49.849	3.489	49.849	49.849
2	.829	11.839	61.688			
3	.756	10.796	72.484			
4	.573	8.183	80.667			
5	.543	7.757	88.424			
6	.460	6.567	94.990			
7	.351	5.010	100.000			

Extraction Method: Principal Component Analysis.