Patterns of co-morbidity between alcohol use and other substance use in the Australian population

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Abstract

The present study describes patterns of co-morbidity between alcohol use and other substance use disorders in the Australian population using data from the 1997 National Survey of Mental Health and Well-Being. Multiple regression analyses examined whether the observed associations between alcohol and other drug use disorders were explained by other variables, including demographic characteristics and neuroticism. We also assessed whether the presence of co-morbid substance use disorders affected treatment seeking for a mental health problem. Alcohol use was related strongly to the use of other substances. Those who did not report alcohol use within the past 12 months were less likely to report using tobacco, cannabis, sedatives, stimulants or opiates. Higher rates again were observed among those with alcohol use disorders: half (51%) of those who were alcohol-dependent were regular tobacco smokers, one-third had used cannabis (32%); 15% reported other drug use; 13% met criteria for a cannabis use disorder and 7% met criteria for another drug use disorder. These associations were not accounted for by the demographic and other variables considered here. Co-morbid substance use disorders (sedatives, stimulants or opioids) predicted a high likelihood of seeking treatment for a mental health problem among alcohol-dependent people. [Degenhardt L, Hall W. Patterns of co-morbidity between alcohol use and other substance use in the Australian population. Drug Alcohol Rev 2003;22:7–13]

Key words: alcohol, co-morbidity, drugs, drug use disorders, epidemiology.

Introduction

Alcohol is one of the most commonly used psychoactive substances in the Western world. In 1998, the Australian National Drug Strategy Household Survey estimated that around nine in 10 people aged 14 years and over had used alcohol at some point in their lives and 83% had done so in the past year [1].

In 1997, the Australian Bureau of Statistics (ABS) conducted the National Survey of Mental Health and Well-Being, the first Australian population survey of the prevalence of mental disorders and assessed DSM-IV alcohol and other drug use disorders (abuse and dependence). DSM-IV substance abuse criteria required a pattern of substance use that is causing clinically significant distress or impairment [2]. DSM-IV substance dependence criteria required a cluster of three or more indicators that a person continues to use the substance despite significant substance-related problems [2].

Previous US epidemiological research has suggested that alcohol use is associated with other substance use. US surveys have found an association between daily cigarette smoking and alcohol use [3]. The US Epidemiological Catchment Area (ECA) study found that those with lifetime alcohol abuse/dependence were significantly more likely to have used other drugs, and to meet criteria for another drug use disorder [4]. Just over one in five people (22%) meeting lifetime criteria for alcohol abuse or dependence also met criteria for another drug use disorder, with the majority of such people meeting criteria for a cannabis use disorder [4]. Similar results were also found in the US National Comorbidity Survey (NCS) [5]. However, there has been no previous examination of co-morbidity between alcohol use disorders and other substance use disorders in the Australian population.

Several factors are consistently related to alcohol use disorders and other substance use disorders, which may explain this pattern of co-occurrence or co-morbidity
between alcohol and other drug use disorders. Males are more likely than females to use alcohol [6] and to meet criteria for alcohol use disorders [4,7]. They are also more likely to use other substances and meet criteria for substance use disorders [8]. Age is also a strong predictor of alcohol and other substance use disorders, with younger people more likely to meet such criteria than older people [4, 6–9]. Education is negatively related to involvement with alcohol use [10] and use disorders [4, 6]. Individuals with heavier alcohol use, and those who meet criteria for alcohol use disorders, are more likely to be unemployed [4].

Temperament may also be associated with alcohol use, particularly the trait of neuroticism. People who score high on measures of neuroticism have been characterized as more anxious, worried, depressed and moody [11]. Research has shown that people with heavier alcohol and other substance use are likely to have higher scores on neuroticism than those with less heavy use [12, 13].

The prevalence of co-morbid alcohol and other drug use problems is especially common in clinical settings [14]. This has considerable implications for clinicians, as co-morbid substance use problems, if untreated, may worsen the outcome for the primary substance use disorder that is being treated. A question worth answering is whether there is a relationship in the general population between having co-morbid substance use problems and seeking help for a mental health problem among people who have alcohol use problems.

Study aims

The present study aims to examination the pattern of co-morbidity between alcohol use and other drug use disorders in the Australian general population using data collected by a standardized diagnostic interview. We use data from the National Survey of Mental Health and Well-Being (NSMHWB) that were collected in 1997 by the Australian Bureau of Statistics. This was a survey of a nationally representative sample of Australian adults aged 18 years and over who were asked about their substance use and symptoms of DSM-IV substance abuse and dependence.

The present study used these data from the NSMHWB to address the following questions:

1. What are the patterns of co-morbidity between the levels of alcohol use (no use, alcohol use without meeting criteria for a use disorder, abuse and dependence) and:
   a. Tobacco, cannabis and other substance use (sedatives, stimulants or opiates);
   b. DSM-IV cannabis and other substance use disorders?
2. Are these patterns explained by common factors: demographics or neuroticism?
3. Does the presence of a co-morbid substance use disorder affect the likelihood of treatment seeking among people with alcohol use disorders?

Method

The NSMHWB sample was a random stratified, multi-stage area sample of 10,641 residents in private dwellings aged 18 years and over across all States and Territories in Australia. More detail on the sampling design and conduct of the NSMHWB is provided in [15, 16]. Questions about drug use and symptoms of disorders were restricted to the last 12 months. DSM-IV disorders were assessed by a modified version of the CIDI [17]; the validity and reliability of the CIDI has been described elsewhere [18].

Assessment of alcohol use, abuse and dependence

Respondents were asked if they had consumed at least 12 standard drinks (each 10 g alcohol) within the past 12 months. All those who reported such use, and who had consumed more than three standard drinks on one occasion, were assessed for symptoms of alcohol abuse and dependence.

Assessment of other substance use, abuse and dependence

All people were asked whether they currently used tobacco; if so, they were asked if their use was regular (at least daily). Previous research has suggested that 55–87% of current tobacco smokers will be nicotine-dependent [19–21].

People were asked if they had used cannabis, stimulants, sedative or opiates more than five times within the past year. If they did so, they were assessed for symptoms of abuse and dependence. Respondents were given a detailed verbal description of each drug group and list of drugs in each class:

- Cannabis: marijuana and hashish;
- Stimulants: amphetamines, ecstasy, speed and other stimulants which can be obtained by medical prescription including, dextedrine, pre-ludin and ritualin;
- Sedatives: barbiturates and tranquillizers and other sedatives which can be obtained by medical prescription including, ativan, librium, mogadon, normison, rohypnol, serepax, valium, xanax;
- Opioids: heroin and opium as well as other opioids and analgesics which can be obtained on medical prescription including, codeine, doloxene, methadone, morphine, percodan and pethidine.
Treatment seeking

A person was classified as having sought help for a mental health problem if they reported any of the following for a mental health problem: admission to a hospital, psychiatric ward, drug and alcohol unit or other hospital for a mental health problem; or having seen a general practitioner, psychologist, psychiatrist, social worker, mental health team, counsellor, nurse, ambulance officer, surgeon, physician, pathologist, radiologist, chemist or other health professional. People were asked about treatment seeking for a mental health problem at low rates of treatment seeking for any mental health problem had been found previously in general population samples [22]. People often seek a mental health specialist for more than one reason, of which one is likely to be a substance use problem, given the co-morbidity observed in the general population between mental health problems and substance use problems [23].

Definitions of alcohol and other drug use

People who reported drinking 12 or more standard drinks (each 10 g alcohol) within the past 12 months were classified as having used alcohol. In some analyses, those who reported such use are subdivided into three groups: those who drank without meeting criteria for a use disorder, those who met criteria for alcohol abuse/harmful use without dependence, and those who met criteria for dependence. Hence, a four-level variable of alcohol-involvement was created: no alcohol use in the past 12 months, alcohol use without meeting criteria for a DSM-IV disorder, meeting criteria for DSM-IV alcohol abuse and meeting criteria for DSM-IV alcohol dependence.

Data analysis

Weighted estimates of the 12-month prevalence of DSM-IV alcohol use disorders are presented in this paper. Estimates were weighted to conform to independent population estimates by State, part of State, age and sex. In addition, balanced repeated replicate weights were used to account for the complex survey sampling design. Prevalence estimates and their standard errors were calculated using SUDAAN version 7.5.3 [24].

Logistic regressions were carried out using STATA 5.0 for Windows [25] to assess patterns of relationships between alcohol and other drug use disorders. First, a bivariate logistic regression was carried out, in which only the alcohol involvement variable was included. This was followed by multiple logistic regression analyses in which the following sets of variables were added in the regression model:

(1) Demographic variables:
   (a) Gender (reference category: female);
   (b) Age (reference category: 18–35 years, compared to 35–54, 55+);
   (c) Education (reference category: completed less than secondary education, compared to completed secondary education, completed post-secondary education);
   (d) Marital status (reference category: currently married; compared to separated/divorced/widowed/de facto/never married);
   (e) Employment status (reference category: employed full-time; compared to employed part-time, unemployed, not in the labour force).

(2) Neuroticism score [11].

Results

Approximately one-quarter of people in the NSMHWB (26.5%) had not consumed 12 or more standard drinks of alcohol in the past year; two-thirds (68%) had used alcohol without meeting criteria for a DSM-IV use disorder, 1.9% met criteria for alcohol abuse and 4.1% met criteria for dependence.

Those who did not drink alcohol were less likely to smoke tobacco or report the use of other drug types in the past year (Table 1). Among those who drank alcohol without meeting criteria for a use disorder, one-quarter (24%) were regular tobacco users, 7% reported cannabis use and 3% reported using other illicit drugs.

These proportions were much higher among those who were alcohol dependent, half of whom (51%) were regular tobacco users, one-third (31%) of whom were cannabis users, and 15% of whom reported using other drugs more than five times in the past year (Table 1).

Significant associations were also observed between alcohol use and cannabis and other drug use disorders (Table 1). Around one in 100 non-drinkers met criteria for a cannabis use disorder, with less than 1% meeting criteria for another drug use disorder. These proportions increased with level of involvement with alcohol, so that one in seven (15%) alcohol-dependent people met criteria for a cannabis use disorder (odds ratio (OR) = 19.3 compared to non-drinkers), and one in 14 met criteria for a sedative, stimulant or opiate use disorder (OR = 10.0; Table 1).

Do common factors explain the association?

Table 1 also shows the odds ratios (and their 95% confidence intervals) between alcohol use and other drug disorders derived from multiple logistic regressions. These 'adjusted' odds ratios control for the
effects of demographic variables (age, gender, education, marital status, employment status) and trait neuroticism.

Clearly, those who used alcohol were more likely than those who did not to also report using other substances, even after adjusting for these variables. Regular tobacco use remained significantly more common among drinkers than non-drinkers, with those who used alcohol between 1.8 and 4.2 times more likely than non-drinkers to be current regular tobacco smokers after adjusting for other variables (Table 1).

Those who met criteria for DSM-IV alcohol abuse or dependence were more likely to report regular tobacco use than drinkers who did not meet criteria for a disorder, as shown by the fact that the 95% confidence intervals for the adjusted odds ratios do not overlap (Table 1).

Cannabis use in the past 12 months also remained significantly more common in drinkers than non-drinkers (Table 1). The adjusted odds ratios were higher among those with problematic alcohol use, with those meeting criteria for alcohol abuse or dependence most likely to report cannabis use (adjusted OR = 3.0 for drinkers; OR = 7.5 for abuse; OR = 9.0 for dependence). Those who met criteria for alcohol abuse or dependence remained significantly more likely than non-drinkers to also meet criteria for a cannabis use disorder (adjusted OR = 3.5 and 5.8, respectively).

The use of sedatives, stimulants or opiates within the past year also remained more likely among alcohol users. Those who met criteria for DSM-IV alcohol abuse (adjusted OR = 3.6) or dependence (adjusted OR = 4.5) were more likely than both non-drinkers and those who had used alcohol without meeting criteria for a disorder to report use of these drugs. Those who met criteria for DSM-IV alcohol dependence remained more likely than non-drinkers to meet criteria for another drug use disorder.

**Effect of co-morbid substance use problems on treatment seeking**

Table 2 shows the prevalence of treatment seeking according to level of involvement with alcohol use, and the absence or presence of regular tobacco use, and cannabis and other drug use disorders. Tobacco use was not associated with an increased likelihood of having sought help for a mental health problem at any level of involvement with alcohol use. Nor were cannabis use disorders associated with an increased likelihood that people with alcohol use disorders had sought treatment for a mental health problem. How-

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**Table 1. Prevalence (%) and univariate and adjusted odds ratios (OR) and 95% confidence intervals (95%CI) of other substance use and use disorders according to alcohol use**

<table>
<thead>
<tr>
<th>Substances</th>
<th>Prevalence (SE)</th>
<th>OR</th>
<th>95%CI</th>
<th>Adjusted OR</th>
<th>Adjusted 95%CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular tobacco use</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No alcohol use</td>
<td>15.3 (0.9)</td>
<td>1.00</td>
<td></td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Alcohol use</td>
<td>23.9 (0.6)</td>
<td>1.72</td>
<td>1.54, 1.92</td>
<td>1.82</td>
<td>1.62, 2.06</td>
</tr>
<tr>
<td>Alcohol abuse</td>
<td>48.7 (8.6)</td>
<td>5.31</td>
<td>3.93, 7.24</td>
<td>4.14</td>
<td>3.00, 5.70</td>
</tr>
<tr>
<td>Alcohol dependence</td>
<td>31.0 (4.0)</td>
<td>5.75</td>
<td>4.66, 7.10</td>
<td>4.16</td>
<td>3.31, 5.94</td>
</tr>
<tr>
<td>Cannabis use</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No alcohol use</td>
<td>1.9 (0.5)</td>
<td>1.00</td>
<td></td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Alcohol use</td>
<td>7.1 (0.4)</td>
<td>3.61</td>
<td>2.73, 4.76</td>
<td>2.95</td>
<td>2.20, 3.94</td>
</tr>
<tr>
<td>Alcohol abuse</td>
<td>27.3 (7.7)</td>
<td>17.57</td>
<td>11.53, 26.76</td>
<td>7.45</td>
<td>4.74, 11.71</td>
</tr>
<tr>
<td>Alcohol dependence</td>
<td>31.5 (2.9)</td>
<td>22.20</td>
<td>15.96, 30.88</td>
<td>8.99</td>
<td>6.29, 12.85</td>
</tr>
<tr>
<td>Cannabis use disorder</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No alcohol use</td>
<td>0.9 (0.2)</td>
<td>1.00</td>
<td></td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Alcohol use</td>
<td>1.8 (0.2)</td>
<td>1.87</td>
<td>1.22, 2.86</td>
<td>1.45</td>
<td>0.92, 2.27</td>
</tr>
<tr>
<td>Alcohol abuse</td>
<td>10.6 (3.6)</td>
<td>11.22</td>
<td>5.97, 21.11</td>
<td>3.52</td>
<td>1.79, 6.92</td>
</tr>
<tr>
<td>Alcohol dependence</td>
<td>15.3 (2.7)</td>
<td>19.28</td>
<td>12.06, 30.88</td>
<td>5.81</td>
<td>3.50, 9.65</td>
</tr>
<tr>
<td>Other drug use</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No alcohol use</td>
<td>2.8 (0.4)</td>
<td>1.00</td>
<td></td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Alcohol use</td>
<td>3.0 (0.4)</td>
<td>1.23</td>
<td>0.94, 1.60</td>
<td>1.43</td>
<td>1.08, 1.89</td>
</tr>
<tr>
<td>Alcohol abuse</td>
<td>10.9 (2.8)</td>
<td>4.13</td>
<td>2.41, 7.10</td>
<td>3.61</td>
<td>2.05, 6.37</td>
</tr>
<tr>
<td>Alcohol dependence</td>
<td>15.3 (3.2)</td>
<td>7.26</td>
<td>5.15, 10.26</td>
<td>4.54</td>
<td>3.11, 6.62</td>
</tr>
<tr>
<td>Other drug use disorder</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No alcohol use</td>
<td>0.7 (0.3)</td>
<td>1.00</td>
<td></td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Alcohol use</td>
<td>0.6 (0.1)</td>
<td>0.74</td>
<td>0.44, 1.24</td>
<td>0.99</td>
<td>0.52, 1.56</td>
</tr>
<tr>
<td>Alcohol abuse</td>
<td>2.2 (1.3)</td>
<td>2.90</td>
<td>0.99, 8.51</td>
<td>2.05</td>
<td>0.67, 6.27</td>
</tr>
<tr>
<td>Alcohol dependence</td>
<td>7.3 (2.3)</td>
<td>9.97</td>
<td>5.72, 17.39</td>
<td>4.76</td>
<td>2.57, 8.83</td>
</tr>
</tbody>
</table>

1 Adjusted for age, gender, educational attainment, relationship status, employment status and neuroticism.
ever, other drug use disorders did appear to do so. Although caution is necessary because of the width of the confidence intervals around some of the estimates, people with other substance use disorders appear more likely to have sought treatment. There did not appear to be a relationship between the likelihood of having sought treatment, and the level of involvement with alcohol use.

Discussion

A significant minority of Australian adults have an alcohol use disorders: around one in 25 people (4.1%) met criteria for DSM-IV alcohol dependence within the past 12 months, and another one in 50 (1.9%) meeting criteria for DSM-IV alcohol abuse. Alcohol use was associated with a number of demographic variables: being male, being a young adult, lower levels of education and unemployment (for more detail, see [18,26,27]).

Other substance use and substance use disorders were more common among people who used alcohol, and were even more common among people who abused alcohol or were alcohol-dependent according to DSM-IV. People meeting criteria for DSM-IV alcohol dependence were the most likely of all to have a range of other substance use problems, including regular tobacco use (51%), cannabis use disorders (15%) and other drug use disorders (7%). Non-drinkers, by contrast, were less likely to be: regular tobacco users (15%); to have a cannabis use disorder (1%); and use other drug types. These findings are consistent with those of the ECA and NCS [4,5].

Multiple regression analyses revealed that the association between alcohol abuse and dependence, and cannabis and other substance use disorders, was not accounted for by the other variables considered here (demographic variables and trait neuroticism). In contrast, the association between alcohol use and other substance use disorders did not remain after accounting for the variables considered here. This finding is consistent with other research that has documented significant co-morbidity between alcohol dependence and other substance use problems.

On the basis of the present cross-sectional data, it is difficult to decide between a number of explanations that have been put forward to explain co-morbidity: that other common factors explain the co-occurrence, for example, common genetic factors [28–30] and common environmental factors [28,30]; that there is a causal relationship between alcohol dependence and other substance dependence, with alcohol acting as a 'gateway' drug; or that alcohol and other substance dependence is part of a general vulnerability to problem behaviour [31].

Effects of co-morbid substance use problems on treatment seeking

The presence of a co-morbid cannabis use disorder did not appear to be related strongly to an increased likelihood of treatment seeking for a mental health problem among people with alcohol use disorders. However, alcohol-dependent people with other substance use disorders (namely, sedative, stimulant or opiate use disorders) were more likely to have sought help for a mental health problem. Hence, among alcohol-dependent people who come to the attention of mental health professionals, the prevalence of other substance use disorders is likely to be even higher than it is among alcohol-dependent people in the general community.

Table 2. Weighted prevalence of treatment seeking for a mental health problem by alcohol use status, according to presence of other substance use disorders

<table>
<thead>
<tr>
<th></th>
<th>No regular tobacco use</th>
<th>Regular tobacco use</th>
<th>No cannabis use disorder</th>
<th>Cannabis use disorder</th>
<th>No other drug use disorder</th>
<th>Other drug use disorder</th>
</tr>
</thead>
<tbody>
<tr>
<td>No alcohol use</td>
<td>10.3 (0.6)</td>
<td>18.5 (2.4)†</td>
<td>11.3 (0.6)</td>
<td>47.0 (15.1)†</td>
<td>11.1 (0.6)</td>
<td>75.4 (11.4)†</td>
</tr>
<tr>
<td>Alcohol use</td>
<td>9.2 (0.7)</td>
<td>11.6 (1.0)</td>
<td>9.6 (0.5)</td>
<td>20.4 (7.4)†</td>
<td>9.5 (0.5)</td>
<td>59.9 (10.4)†</td>
</tr>
<tr>
<td>Alcohol abuse</td>
<td>14.4 (4.4)*</td>
<td>8.8 (3.7)*</td>
<td>12.7 (3.8)*</td>
<td>3.5 (4.0)*</td>
<td>11.3 (3.2)</td>
<td>31.1 (54.6)*</td>
</tr>
<tr>
<td>Alcohol dependence</td>
<td>24.4 (5.4)</td>
<td>34.5 (5.0)</td>
<td>29.7 (3.3)</td>
<td>29.0 (14.3)*</td>
<td>28.1 (2.4)</td>
<td>48.1 (10.3)</td>
</tr>
</tbody>
</table>

*This estimate must be considered with caution given the large amount of error surrounding the estimate.
†Significant difference between no regular use/use disorder, and regular use/use disorder groups more likely to have sought help. The 95% confidence intervals can be calculated by multiplying the SE by 1.96, and adding/subtracting from the prevalence estimates (thus obtaining the upper and lower limits). Those estimates that are significantly different at the 0.05 level of significance are those whose 95% confidence intervals do not overlap.
Treatment implications

The fact that a significant proportion of the Australian adult population met criteria for alcohol use disorders within the past year does not necessarily mean that all these people required specialist or inpatient treatment for their alcohol use problems. First, a large number of people who have alcohol use disorders are likely to remit without receiving professional help [32,33]. Secondly, many people with mild alcohol use disorders are not interested in receiving treatment [34]. Thirdly, to attempt to identify and treat all alcohol use disorders may medicalize behaviour that can be changed through other means. There are a range of approaches to the treatment of alcohol use problems, including public health campaigns, brief interventions and out-patient counselling, which are probably appropriate for the majority of people with problematic alcohol use who do require and desire help [33]. There will nevertheless be the need for targeted interventions among some groups that appear to be experiencing chronic, dependent use of alcohol or a history of significant alcohol-related problems [33].

Alcohol use disorders complicated by other drug use disorders may be more likely to be chronic and disabling, and (consistent with the findings of the present study) result in greater service utilization [35]. Chronic disorders are likely to therefore cause greater disability, and social costs in terms of marital breakdown, social isolation, poor educational attainment, unemployment and chronic financial difficulties [35].

Given that co-morbid substance use problems are even more likely among alcohol-dependent people who have sought treatment, more attention needs to be given to assessing people with alcohol use problems for other substance use disorders and to considering concurrent treatment of these other disorders. Research has revealed that concurrent treatment of more than one substance (e.g. tobacco use and alcohol use) is safe [36,37], is well accepted by clients [38,39] and improves the outcomes of alcohol treatment [39].

Conclusion

Alcohol use and alcohol use disorders in the community are commonly co-morbid with other substance use and substance use disorders in ways that are not explained by common risk factors that were examined here. The co-morbidity of alcohol use disorders with sedative, stimulant and opioid use disorders increases the chance of seeking help, so that the prevalence of these patterns of co-morbidity is even higher in treated populations. This fact needs to be better reflected in the assessment and treatment practices of specialist treatment services for alcohol disorders and in general practice where most such disorders are first seen [33].

Acknowledgements

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References


