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Substance use disorders comorbid with mood and anxiety disorders in the Australian general population

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Abstract

Introduction and Aims. *Substance use disorders (SUDs) are common and frequently co-occur with mood and anxiety disorders. This paper provides a detailed analysis of patterns, prevalence and correlates of mood and anxiety disorders among those with a (i) pure SUD; (ii) SUD plus a mood or anxiety disorder (SUDs + 1); and (iii) SUD plus a mood and anxiety disorder (SUDs + 2).* ***Design and Methods.*** *Data came from the 2007 National Survey of Mental Health and Wellbeing; a nationally representative household survey of 8841 Australians aged 16–85 years.* ***Results.*** *The 12-month prevalence of SUDs was 5.1%. Of those with a 12-month SUD, 65% met the criteria for pure SUDs, 19% for SUDs + 1 and 16% for SUDs + 2. Major depression was the most common mood disorder in both comorbid groups. One-third of SUDs + 1 experienced social phobia, while over half of SUDs + 2 experienced generalised anxiety disorder. Compared with pure SUDs, SUDs + 1 experienced two times more and SUDs + 2 experienced over four times more days out of role in the preceding 30 days. Both comorbid groups were more likely to experience severe levels of impairment. SUDs + 2 were over 18 times more likely to experience suicidal thoughts in the same year. SUDs + 1 were over three times and SUDs + 2 were over 10 times more likely to have had one or more consultations with a health professional in the previous year.* ***Discussions and Conclusions.*** *These findings highlight the complexities inherent with responding to and treating multiple comorbidities among substance users and emphasise the need for coordinated, cohesive responses from drug and alcohol treatment services.* [Prior K, Mills K, Ross J, Teesson M. Substance use disorders comorbid with mood and anxiety disorders in the Australian general population. *Drug Alcohol Rev* 2016;00:000-000]

Key words: comorbidity, substance use disorder, mood disorder, anxiety disorder, prevalence.

Introduction

Substance use disorders (SUDs) are common. Prevalence estimates in the USA, the UK and Australia indicate that up to one in four adults in the population (14.1–24.2%) will meet the criteria for a Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) SUD over their lifetime [1–3]. SUDs are associated with a range of negative social and public health consequences, particularly high rates of mortality and disability [4] and attempted and completed suicide [5].

Epidemiological surveys consistently report the frequent co-occurrence of SUDs with mood and anxiety disorders [6–10]. Australian estimates suggest that among those with a 12-month SUD, approximately 20% have a mood disorder and over 31% have an anxiety disorder in the same year [11,12]. Conversely, 18% of those with a mood disorder and 12% of those with an anxiety disorder experience a SUD in the same 12-month period [12]. Four primary explanations have been proposed to explain the co-occurrence of these disorders. First, the self-medication hypothesis proposes that individuals with a pre-existing mood or anxiety disorder use substances (and consequently develop a SUD) in an effort to alleviate their psychiatric symptoms [13,14]. Second, drug and alcohol intoxication and withdrawal may induce a variety of mental health symptoms and disorders, such as depression and anxiety [15,16]. Third, the indirect causal hypothesis implies that one disorder affects a third variable in a way that increases the likelihood or developing the other disorder [17]. Fourth, the common factors model proposes that there are common predisposing biological, psychological, social or environmental factors, such as poverty or trauma, which increase the risk of developing

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both disorders [16–18]. Although there is no single explanation regarding the directionality of onset for comorbid SUDs, mood and anxiety disorders, research suggests that once both conditions are established, each may serve to maintain or exacerbate the other [19,20]. While not suggesting any directionality regarding the development of these comorbid relations, the current paper will explore the associations of mood and anxiety disorders among individuals with a 12-month SUD. This perspective has been taken as research demonstrates that people with a SUD have higher comorbid rates of mental disorders than vice versa [9,21,22]. This does not imply that the opposite directional association is not also common.

Individuals with a SUD and a comorbid mental disorder commonly experience greater levels of disability, poorer general physical and mental health, increased service use and increased risk of suicidal behaviours, relative to those without mental disorders [8,12,23,24]. Previous research demonstrates that this impairment increases in proportion to the number of comorbid disorder classes [12,25–28]. However, it is not known whether poor outcomes are associated with specific comorbidities involving SUDs. Epidemiological examinations of comorbidity to-date have tended to focus more broadly on comorbidity between disorder classes and predominantly on comorbidity between mood and anxiety disorders [29–31], as this is the most common comorbidity [2,32,33]. There is a need for more detailed, nuanced examination of comorbidity specifically in relation to SUDs. A more detailed understanding from this perspective is of particular relevance to informing SUD service providers and policymakers. Such an analysis has not previously been conducted in Australia or internationally.

This paper provides a unique opportunity to gain a deeper understanding of these comorbid associations among individuals with a SUD. It will examine the complex patterns and prevalence of individual mood and anxiety disorders among those with increasing levels of SUD comorbidity (i.e. pure SUDs and those with a SUD plus one or two additional disorder classes). It will also be the first to identify whether individuals with pure SUDs meaningfully differ from individuals with SUD comorbidity in terms of their health and well-being. Accurate estimates of the patterns and prevalence of SUD comorbidity at the population level are fundamental to understanding the size and nature of the health challenges posed by these disorders. These estimates, combined with information about health and well-being, provide an evidence base, which has the potential to guide the targeting of prevention and treatment responses to this problem.

Specifically, the aims of this paper are to

1. Provide a detailed analysis of the patterns and prevalence of individual mood, anxiety and SUDs in Australian adults with the following:
   - 'Pure SUDs'—at least one SUD in the absence of any mood or anxiety disorders;
   - 'SUDs + 1'—at least one SUD plus a mood disorder *or* an anxiety disorder;
   - 'SUDs + 2'—at least one SUD plus both a mood disorder *and* an anxiety disorder.
2. Investigate differences in disability, severity of impairment, suicidality and service use between individuals with pure SUDs and individuals with SUDs + 1 and SUDs + 2.

Methods

Sample

The 2007 National Survey of Mental Health and Wellbeing (NSMHWB) is a nationally representative population survey of Australian adults aged 16–85 years. Sampling was based on random selection from a stratified, multistage area probability sample of private dwellings. Private dwellings included houses, flats, home units and any other structures used as private places of residence. The dwelling did not need to be owned to be sampled [34]. Household information was provided by any householder aged 17 years or older. From all eligible respondents, an algorithm randomly selected a householder to complete a personal interview. There were 8841 fully responding participants, which represented a response rate of 60%. Data was weighted according to the inverse probability of being selected. A detailed description of the sampling design, methodology and sample characteristics have been provided elsewhere [35].

Measures

The demographic section assessed age, sex, education, marital status, employment status and country of birth. The demographic characteristics of the total sample have been described in detail previously [35]. For the current paper, demographic variables were recoded into dichotomous variables.

A modified version of the World Mental Health Composite International Diagnostic Interview (WMH-CIDI 3.0) [36] was used to collect lifetime, 12-month and 30-day diagnoses of the three most prevalent mental health disorder classes using both DSM-IV and ICD-10 criteria. The mental disorder classes covered were the following: (i) SUDs – alcohol and drug (marijuana, sedatives, stimulants and opioids) abuse and dependence; (ii) mood disorders – depression, dysthymia, bipolar type I and II; and (iii) anxiety disorders – agoraphobia, social phobia, panic disorder, generalised anxiety disorder, obsessive-compulsive disorder and post-traumatic stress

disorder (PTSD). The present paper focuses on DSM-IV diagnoses, 12-month prevalence and comorbidity between each of these three classes of disorder. The 'without hierarchy' rules were applied in order to capture the true extent of comorbidity [37,38]. Twelve-month comorbidity was a focus in the current paper because it most strongly represents the impact of comorbidity on individuals and treatment systems [33].

Disability was assessed using a measure of 'days out of role'. Respondents were asked how many days in the previous 30 they had been unable to perform, or had to cut down on, their normal activities as a result of health problems. Severity was defined according to an adapted algorithm originally developed by the World Mental Health Survey Initiative team. All individuals with a 12-month mental disorder were classified into one of three severity categories: mild, moderate or severe. Severity is attributed to an individual, not to a mental disorder. It reflects the impact of all mental disorders experienced in a 12-month period on a person's daily life, thus taking into account comorbidity [34]. Suicidality was determined by whether the respondents had 'seriously thought about committing suicide' within the previous 12 months. Service utilisation was defined as at least one consultation with any health professional specifically for mental health problems in the 12 months prior to the interview.

Analysis

Means, frequencies and cross-tabulations were weighted to conform to independent population estimates. A negative binomial regression, with incidence rate ratios (IRR), was used for modelling differences in the number of days out of role because of the over-dispersed nature of the data. The negative binomial regression and multiple logistic regressions, with odds ratios (OR), were used to examine differences in days out of role, severity of impairment, suicidal thoughts and service use across increasing levels of SUD comorbidity

Pure SUDs was the referent group category for all analyses. All regression analyses were adjusted for demographic variables of age, sex, marital status, employment, education and country of birth. Ninety-five per cent confidence intervals (CI) were based on, and standard errors obtained through, the delete-a-group jack-knife variance technique. Differences were considered statistically significant if $p < 0.05$. All survey analyses were performed using Stata version 13 [39].

Results

Prevalence of SUD comorbidity

The 12-month prevalence of SUDs was 5.1%, representing approximately 811 000 Australians. Of those with a 12-month SUD, 65% (95% CI 58.9–71.0) met criteria for pure SUDs, 19% (95% CI 14.2–23.4) for SUDs + 1 and 16% (95% CI 11.2–21.3) for SUDs + 2 in the previous 12 months. Table 1 presents the weighted 12-month prevalence estimates of sociodemographic correlates across the three groups. The corresponding odds ratios for sociodemographic characteristics are presented in Table S1.

In regard to patterns of SUDs (including abuse and dependence), alcohol abuse was the most common single disorder among pure SUDs (66.8%) and SUDs + 1 (55.3%), while alcohol dependence was the most common disorder among SUDs + 2 (54.3%; Table 2). A higher proportion of respondents had drug and alcohol dependence in each higher form of SUD comorbidity. Alcohol use disorders were more common in each of the three groups than drug use disorders; however, the prevalence of drug use disorders was positively associated with increases in SUD comorbidity, from 24.1% to 27.2% to 47.2%, respectively.

Major depression was the most common mood disorder in both comorbid groups (18.1% and 86.1%, respectively). The most common anxiety

Table 1. *Weighted prevalence of sociodemographic correlates across the levels of SUD comorbidity*

	Pure SUDs ($n = 270$)		SUDs + 1 ($n = 80$)		SUDs + 2 ($n = 68$)	
	Weighted %	95% CI	Weighted %	95% CI	Weighted %	95% CI
Female	27.4	19.9–34.9	46.2	31.0–61.3	32.5	18.2–46.7
Aged 25+	56.6	48.6–64.5	66.1	51.1–81.1	74.5	61.1–88.0
Married	22.1	13.9–30.2	20.9	9.9–32.0	17.5	0.3–34.8
Employed	79.8	72.4–87.2	74.0	61.1–86.8	62.6	43.6–81.6
Completed school	49.7	40.5–59.0	43.4	30.4–56.4	39.6	18.6–60.5
Born in Australia	84.8	79.0–90.6	91.6	85.6–97.6	80.7	64.1–97.4

CI, confidence interval; SUDs, substance use disorders.

Table 2. *Weighted prevalence of individual mental disorders across the levels of SUD comorbidity*

	Pure SUDs ($n = 270$)		SUDs + 1 ($n = 80$)		SUDs + 2 ($n = 68$)	
	Weighted %	95% CI	Weighted %	95% CI	Weighted %	95% CI
SUDs						
Alcohol abuse	66.8	60.5–73.1	55.3	41.0–69.6	19.4	7.8–31.1
Alcohol dependence	19.9	14.4–25.3	34.6	20.3–49.0	54.3	37.8–70.8
Drug abuse	17.3	12.2–22.5	17.2	7.5–26.8	15.8	5.4–26.2
Drug dependence	7.2	3.3–11.1	11.6	3.3–19.9	34.8	16.8–52.8
Alcohol use disorder	86.7	81.8–91.5	89.9	82.6–97.1	73.7	61.3–86.1
Drug use disorder	24.1	18.2–30.0	27.2	16.4–37.9	47.2	29.6–64.8
Mood						
Depression	0	—	18.1	7.4–28.8	86.1	75.9–96.3
Dysthymia	0	—	*	*	45.7	26.8–64.6
Bipolar	0	—	*	*	23.2	10.0–36.3
Any mood disorder	0	—	20.0	8.7–31.3	100	—
Anxiety						
Panic	0	—	8.1	0.1–16.2	26.3	5.4–47.3
Agoraphobia	0		5.3	0.3–10.3	8.4	0.4–16.4
Social phobia	0	—	33.3	20.3–46.4	36.0	19.2–52.8
GAD	0	—	16.4	5.2–27.6	50.4	33.9–66.9
OCD	0	—	17.7	8.3–27.1	37.8	17.8–57.8
PTSD	0	—	32.0	16.4–47.5	40.7	24.0–57.3
Any anxiety disorder	0	—	80.0	68.7–91.3	100	—

*Too few to estimate ($n < 5$). CI, confidence interval; GAD, generalised anxiety disorder, OCD, obsessive–compulsive disorder; PTSD, post-traumatic stress disorder; SUDs, substance use disorders.

disorders were social phobia among SUDs + 1 (33.3%) and generalised anxiety disorder among SUDs + 2 (50.4%). SUDs + 1 more commonly suffered from an anxiety disorder than a mood disorder. While, by definition, SUDS + 2 were required to have at least one mood disorder and one anxiety disorder, these individuals had a higher prevalence of every individual mood and anxiety disorder compared with SUDs + 1. SUDs + 1 and SUDs + 2 had similar proportions of respondents reporting social phobia (33.3% and 36.0%) and agoraphobia (5.3% and 8.4%), with every other anxiety disorder appearing more common among SUDs + 2.

Levels of SUD comorbidity and associations with health and well-being correlates

Disability. On average, pure SUDs experienced 2 days out of role (M = 1.9, 95% CI 0.9–2.8), SUDs + 1 experienced 4 days (M = 4.1, 95% CI 1.6–6.5) and SUDs + 2 experienced over 8 days (M = 8.3, 95% CI 5.0–11.5) in the 30 days preceding the interview.

Both comorbid groups experienced a higher number of days out of role, relative to pure SUDs. SUDs + 1 experienced nearly two times more and SUDs + 2 experienced over four times more days out of role compared with pure SUDs (Table 3).

Table 3. *Adjusted odds ratios for health and well-being correlates across the levels of SUD comorbidity*

	Pure SUDs ($n = 270$)	SUDs + 1 ($n = 80$)		SUDs + 2 ($n = 68$)	
		OR*	95% CI	OR*	95% CI
Disability (IRR)	[Ref]	1.9	1.0–3.6	4.2	2.3–7.4
Severe impairment	[Ref]	7.6	2.5–22.9	126.4	30.0–532.9
Suicidal thoughts	[Ref]	4.1	1.1–15.1	20.6	7.5–56.7
Service use	[Ref]	3.1	1.4–6.6	10.7	4.5–25.6

*Adjusted for all demographic variables. CI, confidence interval; IRR, incidence rate ratio; OR, odds ratio; SUDs, substance use disorders.

Severity. The proportion of people that experienced severe levels of impairment was higher in each higher form of SUD comorbidity (Figure 1). The majority of pure SUDs (76.4%, 95% CI 68.7–84.1) experienced mild impairment, over half of SUDs + 1 (58.4%, 95% CI 46.2–70.7) experienced moderate impairment and over three-quarters of SUDs + 2 (77.3%, 95% CI 60.3–94.5) experienced severe levels of impairment.

Compared with pure SUDs, SUDs + 1 were nearly eight times more likely to have experienced severe levels of impairment. SUDs + 2 experienced even higher odds of experiencing severe levels of impairment (Table 3). Although the large CI's suggest that the strength of the association between pure SUDs and SUDs + 2 on the severity of impairment should be interpreted with caution, the estimate provides valuable information on the positive direction of this relationship.

Suicidal ideation. Only 3% of pure SUDs experienced suicidal thoughts in the previous 12 months, while 12% of SUDs + 1 and nearly 41% of SUDs + 2 had seriously thought about killing themselves in the 12 months prior to the interview (Figure 2).

The SUDs + 1 were not significantly more likely than pure SUDs to experience suicidal ideation in the past year, whereas SUDs + 2 were over 18 times more likely to do so (Table 3).

Service utilisation. Nearly one in eight pure SUDs (12.2%) and one in three SUDs + 1 (32.3%) had attended one or more consultations with a health professional in the previous 12 months. The majority of SUDs + 2 had used services, with nearly two-thirds (63.0%) having had at least one consultation in the previous year.

SUDs + 1 were over three times more likely and SUDs + 2 were over 10 times more likely to have visited a health professional for mental health problems (Table 3) in the preceding year.

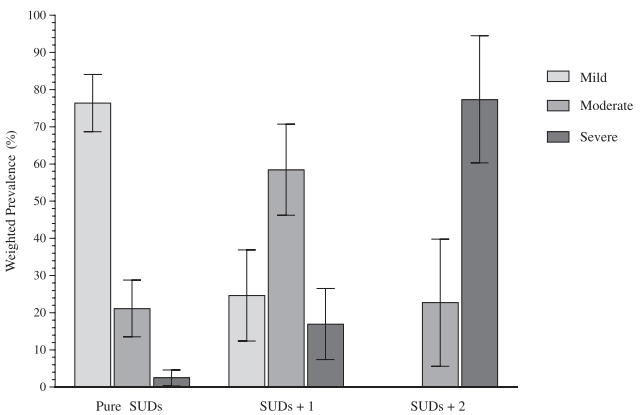

Figure 1. *Weighted prevalence of the severity of impairment across the levels of substance use disorder (SUD) comorbidity.*

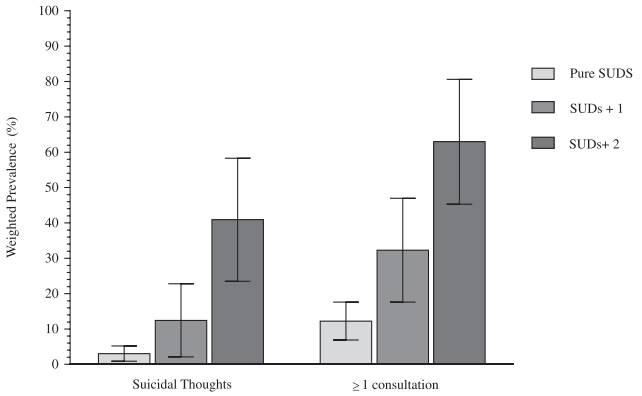

Figure 2. *Weighted prevalence of suicidal thoughts and service use across the levels of substance use disorder (SUD) comorbidity.*

Discussion

To our knowledge, this is the first study to examine the complex patterns and prevalence of individual mood, anxiety and SUDs among individuals with increasing levels of SUD comorbidity. It is also novel in investigating the health and well-being correlates associated with multiple SUD comorbidities, with a focus on pure SUDs as a comparison category. Given the cross-sectional nature of the NSMHWB, it is not possible to comment on causality between SUDs and comorbid mood and anxiety disorders. However, the findings in this paper were reported from the perspective of SUDs to inform SUD service providers and policymakers.

Consistent with previous reports, SUDs were widespread. Of those with a 12-month SUD, nearly two in three people experienced a pure SUD, nearly one in five had a comorbid mood *or* anxiety disorder, and almost one in six had *both* a mood and anxiety disorder. The comorbid groups were predominantly female, unmarried, unemployed and had not completed secondary school, a finding consistent with existing national and international literature [7,8].

Substance use disorders with an anxiety disorder alone were common. Of those with a SUD plus two comorbid disorder classes, the predominant mood and anxiety disorders were depression (86.1%) and generalised anxiety disorder (50.4%). Social phobia was experienced by approximately a third of both comorbid groups and was the only highly prevalent anxiety disorder to be equally common in both groups. This finding supports existing literature regarding the high prevalence and importance of addressing social phobia among those with a SUD [40]. Existing research has also demonstrated that a high proportion of people with social phobia experience SUDs, suggesting that substance use should also be greatly discouraged among individuals with social phobia [41,42]. Recent clinical trials in alcohol and social phobia demonstrate the clinical benefits of addressing this comorbidity [43–45], but few trials address drug use

and social phobia [46]. PTSD was also highly prevalent in both comorbid groups (32.0% and 40.7%, respectively). Irrespective of the temporal ordering of this comorbidity, empirical studies demonstrate the benefits of addressing SUD-PTSD comorbidity [47–49]. The current findings highlight that effective treatment responses need to consider the complexity of the patterns of comorbidity among substance users and build models of care for different clusters of disorders.

Pertaining to alcohol use disorders, a trend emerged between the number of comorbid disorder classes and the severity of substance use (i.e. abuse to dependence), whereby higher proportions of alcohol dependence were apparent in each higher form of SUD comorbidity. This finding is consistent with prior epidemiological research that has shown a higher prevalence and/or risk of mood and anxiety disorders in those with alcohol dependence than alcohol abuse [50–52]. The risk of substance dependence has also been found to be higher than the risk of abuse among individuals with mood and anxiety disorders [38,53]. Although alcohol use disorders were more common in all three groups compared with drug use disorders, the occurrence of drug use disorders was more common among those with comorbid disorder classes. Almost half of those with a SUD plus two comorbid classes experienced a drug use disorder in the preceding year. This may indicate that individuals with more disorder classes are using multiple substances (i.e. poly-drug use), both licit and illicit, to control their various mental health symptoms [54–56].

A clear association emerged between the number of comorbid disorder classes and the prevalence of disability, severity of impairment, suicidality and service use. People with a pure SUD had the fewest of days out of role, the least severe level of impairment and the lowest prevalence of suicidal ideation and help-seeking for their mental health in the past year. In contrast, individuals with a SUD plus two comorbid disorders had the highest rates/prevalence of the aforementioned correlates. These findings confirm those found previously, particularly the rate of service use among individuals with SUDs [8,28]. Higher levels of service use among those with comorbid disorders may indicate poorer well-being and functioning and more severe personal problems related to substance use and additional comorbidities [8].

A novel contribution of this paper, which is of clinical relevance, was an exploration of the strength of association between levels of SUD comorbidity and health and well-being correlates. A major finding was that individuals with a SUD plus one comorbid disorder class were more likely to have taken an increased number of days out of role, to be severely impaired and to have sought help for their mental health than those without a comorbid disorder class. Individuals with a SUD plus two additional disorder classes, nearly half of whom had a drug use disorder, were even more likely to have high levels of disability, to be severely impairment and to have sought help from a mental health professional than those with a pure SUD (which had fewer drug dependent respondents). It is possible that the lifestyle associated with, and consequences of, drug use may partially explain the poorer health and well-being in this highly comorbid group. In addition, those with a SUD plus two comorbid disorder classes were more likely to have experienced suicidal ideation than those with a pure SUD. This finding supports existing literature that demonstrates a high co-occurrence of comorbid mood and SUDs with suicidal ideation and attempts [57–59]. As highlighted by Oquendo *et al.* (2010) [57], this association is complex, and the degree to which SUDs account for suicidal thoughts and behaviours, independently of mood disorders, is not well understood. Bolton *et al.* (2008) [58] showed that drug use disorders were significantly associated with suicidal attempts in depressed men and women after controlling for sociodemographics, mental disorders and the number of depressive symptoms, while alcohol use disorders were not. Future research would benefit from a thorough exploration into the contribution of SUDs to suicidal thoughts and behaviours, beyond what is explained by major depression.

There is little research focusing specifically on the association between levels of SUD comorbidity and health and well-being, using pure SUDs as a referent group, with which these results can be compared. However, these findings build upon previous studies, which report poorer health and well-being in those with an alcohol/drug use disorder and a comorbid mood or anxiety disorder relative to those without mental disorders [8,10,27,60,61]. The current study also extends existing research that has examined health and well-being correlates among individuals with one to four disorder classes, relative to those with no disorder classes [12,25–28]. The current study is unique in its focus on pure SUDs as a comparison category, in an effort to identify whether individuals with pure SUDs meaningfully differ from individuals with SUD comorbidity in terms of their level of disability, severity of impairment, experience of suicidal thoughts and service use. Overall, these findings indicate that a strong association exists between the level of SUD comorbidity and the level of dysfunction. This finding underscores the importance of the development of improved treatments for those individuals with a SUD that meet diagnostic criteria for one or more comorbid disorder class.

In considering the findings of this study, a couple of caveats should be borne in mind. Firstly, as the NSMHWB is a household survey, homeless people, those in prison or other corrective service facilities, people resident in nursing homes, hostels and hospices were not surveyed. This limitation has little impact at

the population level, but prevalence estimates at the subgroup level, for instance people with SUD comorbidity, may be underestimated [35]. As mentioned previously, it is also important to note that while associations between SUD comorbidity and correlates can be described, it is not possible to determine the causality because of the cross-sectional nature of the survey design.

Irrespective of these limitations, the current study has several key strengths, particularly the use of general population data, which enabled sample representativeness and standardised diagnostic assessment. Additionally, an exploration of the patterns of individual disorders in those with increasing levels of SUD comorbidity enabled the specific mood and anxiety disorders that need to be addressed by alcohol and drug treatment services to be inferred. The study clearly shows that additional comorbid diagnoses are associated with poorer health and well-being. Future research is required to develop, implement and assess innovative treatments for mood and anxiety disorders in those with SUDs, using methodologically sound and adequately powered clinical trials.

Conclusions

Comorbidity between SUDs and mood and anxiety disorders is a major health issue for Australians. While the NSMHWB results provide clear and persuasive evidence that a significant proportion of those with SUDs experience at least one comorbid condition, the findings from this paper illustrate that the effect on disability, severity, suicidality and service use appears to be highest among individuals with a SUD and two comorbid disorder classes. Presented with the challenges in responding to complex comorbidity patterns, it is critical that drug and alcohol treatment specialists routinely screen and assess for multiple comorbidities and deliver evidence-based treatments.

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