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COMPREHENSIVE REVIEW

A systematic review of the prevalence of comorbid mental health disorders in people presenting for substance use treatment in Australia

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Abstract

Issues. *The aim of this paper was to conduct a systematic review of the prevalence of comorbid mental health conditions in people accessing treatment for substance use in Australia.* ***Approach.*** *A systematic review identified studies meeting the following eligibility criteria: reporting original data published in English; sample presenting for substance use treatment in Australia; assessing the prevalence of mental health and substance use conditions and reporting the percentage of participants with co-occurring mental health and substance use conditions. A narrative analysis was conducted because of the heterogeneity of methods used to assess key outcome variables and small number of studies assessing particular mental health outcomes. The abstracts of 1173 records were screened, and 59 full articles were assessed for eligibility. Eighteen studies were included in the review.* ***Key Findings.*** *Prevalence estimates of current mental disorders in substance use treatment clients varied (47 to 100%). Mood and anxiety disorders were particularly prevalent, with the prevalence of current depression ranging from 27 to 85% and current generalised anxiety disorder ranging from 1 to 75%.* ***Implications.*** *The high prevalence of mood and anxiety disorders in substance use treatment settings indicates a need for clinicians to screen and assess for these disorders as part of routine clinical care, and be familiar with evidence-based management and treatment strategies.* ***Conclusion.*** *Although further studies are required to determine the prevalence of the full range of mental health disorders in this population, these findings emphasise the high prevalence of comorbid mental disorders are among individuals accessing substance use treatment in Australia.* [Kingston REF, Marel C, Mills KL. A systematic review of the prevalence of comorbid mental health disorders in people presenting for substance use treatment in Australia. *Drug Alcohol Rev* 2016;00:000-000]

Key words: comorbidity, prevalence, substance use disorder, mental disorder, review.

Introduction

Substance use disorders are highly prevalent in Australia, with data from the 2007 National Survey of Mental Health and Wellbeing (NSMHWB) revealing that around one in 20 Australians experienced a substance use disorder in the past year [1]. Substance abuse and dependence can have severe and wide-ranging consequences, including, but not limited to, an increased risk of mortality, blood-borne infectious diseases, liver disease, neurotoxic effects, accidental injury and violence [2].

Mental health disorders are also common, with the 2007 NSMHWB indicating that nearly half of the Australian population will meet criteria for a mental disorder at some point during their lifetime [1,3]. Anxiety disorders are the most prevalent, followed by mood disorders such as depression. Analysis of the 2007 NSMHWB revealed that around 14% of Australians experienced an anxiety disorder and around 6% experienced a mood disorder in the past 12 months [1].

Mental health and substance use disorders frequently co-occur. Data from major North American, European and Australian epidemiological studies reveal that comorbidity between mental health and substance use disorders is highly prevalent [4,5]. For example, 12 month prevalence data from the British Psychiatric Morbidity Survey indicated 30% of people with alcohol dependence and 45% with drug dependence also had a mental health disorder, compared with 12% of the non-dependent population [6]. In the USA, data from the National

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Epidemiological Survey on Alcohol and Related Conditions revealed that among respondents with a 12 month substance use disorder, 20% met criteria for a 12 month mood disorder and 18% met criteria for a 12 month anxiety disorder [7]. In Australia, the 2007 NSMHWB found that one in five Australians with substance use disorders also met criteria for a mood disorder, and one in three met criteria for an anxiety disorder [8]. Consistent with these findings, a recent systematic review and meta-analysis of epidemiological surveys conducted over the last 25 years found the strongest relationships between depression and illicit drug use (pooled odds ratio 3.80), followed by any anxiety disorders and illicit drug use (pooled odds ratio 2.91). Alcohol use was also found to be strongly associated with depression (pooled odds ratio 2.42) and any anxiety disorder (pooled odds ratio 2.11) [5].

Comorbid mental health conditions appear to be even higher in those seeking treatment [8–11]. One possible explanation for this is Berkson's bias [12], which explains that if each individual disorder has independent additive effects on treatment-seeking behaviour, then people experiencing both disorders will be more likely to present for treatment.

There are a number of possible explanations as to why comorbidity may occur [13]. The most widely held view is that substance use disorders may occur as a consequence of repeated use to 'self-medicate' the symptoms of mental health conditions [14]. Although there is some empirical support for this hypothesis, research findings have been mixed, and recent research indicates that this relationship may be complex [15,16]. Substance use disorders may also induce psychiatric symptoms and disorders. Alternate to these direct causal models, there may be an indirect causal relationship between disorders, which is said to exist if one disorder has an effect upon an intermediary factor that, in turn, increases the likelihood of developing the second disorder [17]. For example, research has shown that early onset of substance use reduces the likelihood of completing both secondary and tertiary education [18,19]. Reduced educational opportunities may lead to later life difficulties (e.g. unemployment) that may lead to other problems, such as depression [17]. Last, there may be factors that are common to both substance use and mental disorders, increasing the likelihood that they will co-occur, including shared biological, psychological, social or environmental risk factors (e.g. family violence, cognitive impairment) [13].

Clients with comorbid mental health disorders can present with complex psychological symptoms that have the potential to interfere with treatment for the substance use disorder, and the long term outcomes of substance use treatment [20–23]. Typically, clients with comorbid mental health and substance use conditions present with a more severe clinical profile compared to clients with a substance use disorder alone, including poorer physical health, more severe substance use, increased risk of homelessness, poorer social and occupational functioning and greater difficulties in interpersonal and family relationships [24,25].

Despite there being evidence to suggest that mental health conditions are more prevalent among those seeking treatment [8–11], the nature and patterns of mental health conditions seen in substance use treatment settings are not clear. For example, it is not known what types of disorders are most commonly presenting to treatment, whether patterns reflect lifetime or concurrent comorbidity and what implications these have for substance use treatment settings. Having access to this information would assist clinicians working in substance use treatment settings to deliver informed, targeted, co-ordinated care, and make evidence-based decisions regarding service planning and delivery. Moreover, by reviewing Australian studies, it also ensures that the conclusions drawn from this review are likely to be relevant and applicable to Australian treatment settings, as there may be national and/or cultural variations in patterns of comorbidity.

The past decade has seen a growing body of research conducted in Australian substance use treatment settings which has assessed the prevalence of comorbid mental health disorders. However, to date, there has been no systematic review conducted to synthesise and interpret this body of data. Therefore, the aim of this review is to document and describe the prevalence of comorbid mental health conditions in clients presenting to treatment for substance use disorders in Australia.

Method

Five bibliographic databases (MEDLINE, EMBASE, PsycINFO, CENTRAL, CINAHL) were searched in February 2015 for relevant peer-reviewed published original research articles. In order to identify relevant articles, the search strategy was structured such that articles would be identified if they contained at least one keyword from each of the following five groups: (i) mental health disorders (e.g. depression, mood disorders, psychiatric disorders); (ii) substance use disorders and substance use (e.g. addiction, drug, heroin); (iii) treatment seeking/accessing (e.g. therapy, medication, intervention); (iv) comorbidity prevalence (e.g. prevalence, comorbidity, dual diagnosis); and (v) location (i.e. Australia). A combination of free-text search terms and subject headings was used. No restrictions were placed on publication date. The search strategy was developed, revised and agreed upon by all authors before the search took place. The full strategy, including keywords used,

can be found in the Supporting Information accompanying this article.

Selection of studies was restricted to those meeting the following eligibility criteria: published in the English language; original research/data not previously reported elsewhere; participant sample resident in Australia; measured the outcomes of interest (i.e. presence of mental health and substance use disorders); clinical sample presenting for treatment in substance use treatment setting; and reported prevalence rate (percentage) of co-occurring mental health and substance use disorders in the sample.

The procedure for study selection and data extraction was as follows. Search results were exported from the bibliographic databases and imported into the systematic review software, EPPI-Reviewer 4 [26], and duplicate records were removed. Two independent raters screened 10% of titles and abstracts for eligibility. After confirming that the agreement between raters was high, one rater screened the remaining titles and abstracts. Articles assessed as potentially eligible for inclusion were subject to full-text review by two independent raters (RK and CM). Disagreements about study inclusion were primarily resolved by discussion between the two raters, but in cases where there were differences in interpretation, a third person provided arbitration (KM).

Once the studies to be included had been selected, data were extracted into a spreadsheet by one rater (RK), and the accuracy of this was confirmed by a second rater (KM). The following information was extracted: sample size; gender; age range; year(s) of data collection; state; type of treatment setting; primary substance to be targeted in treatment; instruments used to generate prevalence data and prevalence estimates in percentages for any mental health conditions assessed.

In a small number of cases, age ranges were not available. In these cases, as child participants were not mentioned when reviewing the articles, it was assumed the sample comprised adults over 18 years old. It was also necessary to manually calculate prevalence percentages for some studies (e.g. in a study that also contained a group of participants not presenting to treatment, we used the data reported in the paper to calculate prevalence estimates for only those participants presenting to treatment, as per the aim of the review).

Because of the heterogeneity of methods used to assess mental health prevalence, and the small number of studies assessing certain mental health conditions, we undertook a narrative analysis rather than a meta-analysis. We have used the term 'mental health condition' in reference to studies that used screening questionnaires or other non-diagnostic tools to assess mental health, and 'mental health disorder' in reference to studies that used diagnostic instruments. The term 'condition' is also used when referring to a group of studies reporting results from a mix of screening tools/diagnostic instruments, and also when referring more broadly to mental health symptoms (as opposed to diagnosable disorders).

Results

Figure 1 presents the study selection procedure. After duplicates were removed, the search strategy identified 1173 records. Following screening of titles and abstracts, 59 full text articles were assessed for eligibility. Eighteen studies met the inclusion criteria, and characteristics of these studies are presented in Table 1.

Considering the type of substance use treatment settings studied, there were a range of services, comprising general outpatient services, substitution treatments (e.g. methadone, buprenorphine), residential rehabilitation and inpatient withdrawal care/detoxification services. Participants also presented for treatment relating to various types of substance use: three studies focused on heroin as the primary substance [27–29], three focused on opioids [30–32], two focused on methamphetamine [33,34], one

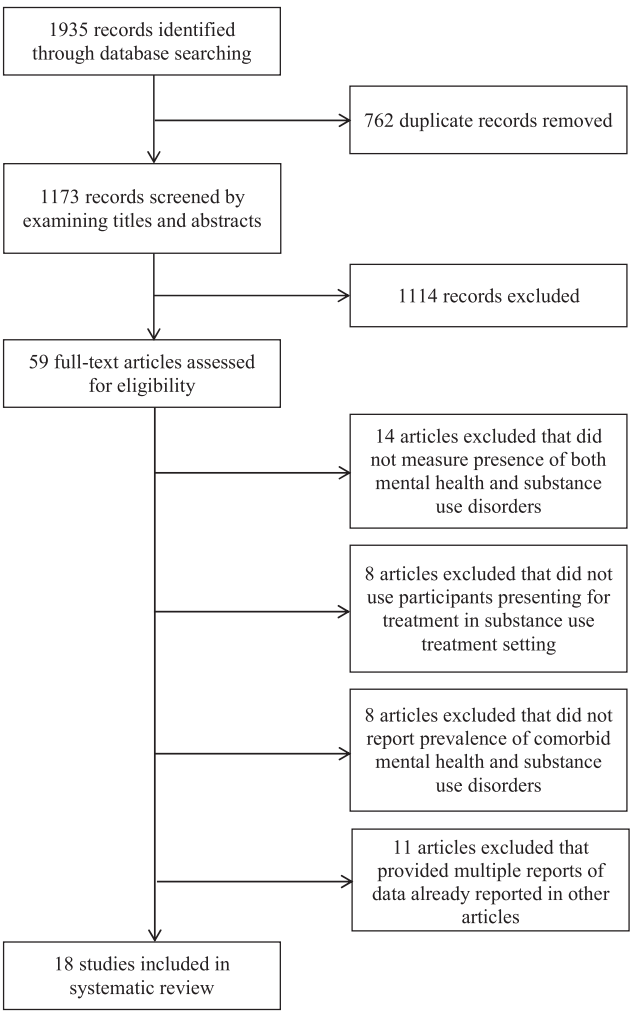

Figure 1. *Flow chart for the study selection procedure.*

Table 1. *Characteristics of included studies*

Study	Treatment setting	Primary substance to be targeted	Dates of data collection (years)	*N*	Gender, % male	Age range, years	State	Instruments used to measure mental health prevalence
Baker *et al.* (2004) [35]	Brief outpatient intervention (research trial)	Amphetamine	2001 – 2002	214	63	16–55	Qld, NSW	BDI-II
Burns *et al.* (2005) [22]	General outpatient service	Alcohol	2000 – 2002	98	68	18+	NSW	CIDI
Callaly *et al.* (2001) [27]	Substitution treatment (methadone maintenance)	Heroin	1999	62	71	16–55	Vic	CIDI
Cole *et al.* (2008) [37]	2 sites: Inpatient withdrawal care/detoxification, residential rehabilitation	Any substance use	Unspecified	165	56	16–62	Vic	Review of clinical notes
Darke *et al.* (1992) [30]	Substitution treatment (methadone maintenance)	Opioids	1989 – 1990	239	60	17–45	NSW	GHQ-28
Darke *et al.* (1994) [28]	Substitution treatment (methadone maintenance)	Heroin	1992	222	60	18–45	NSW	BDI, STAI, GHQ-28, ASPD module of Diagnostic Interview Schedule for DSM-III
Deane *et al.* (2013) [38]	Residential rehabilitation	Any substance use	2008 – 2011	1105	83	17–73	NSW, Qld, ACT	ASI
Dingle *et al.* (2009) [39]	Inpatient withdrawal care/detoxification followed by outpatient service	Any substance use	Unspecified	104	52	18+	Qld	Diagnostic interview for DSM-IV
Dore *et al.* (2012) [40]	Inpatient withdrawal care/detoxification	Any substance use	2008 – 2009	253	67	18+	NSW	TSQ, Zung Self-Rating Depression Scale
Dyer *et al.* (2005), Study 1 [33]	Inpatient withdrawal care/detoxification	Methamphetamine	1995 – 2003	202	60	18–46	WA	Review of clinical notes
Hood *et al.* (2009), Study B [36]	Outpatient withdrawal care/detoxification (flumazenil treatment)	Benzodiazepine	Unspecified	13	46	18+	WA	MINI v5
Johns *et al.* (2009) [41]	Residential rehabilitation	Any substance use	1997 – 2002	41[a]	0	18–52	NSW	Psychiatric assessment interview
Lubman *et al.* (2007) [42]	Youth outpatient service	Any substance use	2004 – 2005	100	53	16–22	Vic	Structured Clinical Interview for DSM-IV
McKetin *et al.* (2011) [34]	41 sites: Residential rehabilitation, inpatient withdrawal care/detoxification, general outpatient service	Methamphetamine	2006 – 2007	400	74	16–54	NSW, Qld	CIDI
Mortlock *et al.* (2011) [43]	Residential rehabilitation	Any substance use	Unspecified	278	84	18–68	NSW, Qld, ACT	Mental Health Screening Form III
Ross *et al.* (2005) [29]	38 sites: Substitution treatment (methadone and buprenorphine maintenance), inpatient	Heroin	2001 – 2002	745[b]	65	18–56	NSW, VIC, SA	CIDI, Diagnostic Interview Schedule

Table 1 (continued)

Study	Treatment setting	Primary substance to be targeted	Dates of data collection (years)	*N*	Gender, % male	Age range, years	State	Instruments used to measure mental health prevalence
	withdrawal care/detoxification, residential rehabilitation							(modified for DSM-IV diagnoses)
Wang *et al.* (2008) [31]	Substitution treatment (methadone maintenance)	Opioids	Unspecified	50	50	18+	Vic	BDI-II
Watson *et al.* (2007) [32]	Substitution treatment (opioid maintenance)	Opioids	Unspecified	53	57	22–61	NSW	DASS-21

[a]There were 71 participants in total but only 41 had a psychiatric assessment where comorbid mental health disorders were assessed. [b]There were 825 participants in total but 80 were not receiving any treatment.

focused on amphetamine [35], one focused on benzodiazepines [36] and one focused on alcohol [22]. Seven studies were not targeting any specific type of substance in treatment, but rather any problematic substance use [37–43]. Comorbid mental health conditions were assessed using a range of methods, including diagnostic interviews [22,27–29,34,36,38,39,41,42], questionnaires [28,30–32,35,40,43] and reviews of clinical notes [33,37].

The nature of the prevalence data obtained varied considerably across studies. Some studies reported prevalence data for discrete mental health conditions (e.g. depression), others provided information on the prevalence of broader disorder categories (e.g. mood disorders), some provided data on the prevalence of any psychiatric diagnosis (i.e. the percentage of participants with any mental health disorder) and other studies reported a combination of these types of data. The reference period within which comorbid disorders were measured also varied both within and between studies; thus, a mixture of lifetime, 12 month and current (ranging from 'right now' through to 'past month'; see Tables 2–4) prevalence estimates is reported.

Regarding risk of bias assessment, most tools are designed for experimental studies, and there are a lack of tools available to assess risk of bias in observational studies, such as those assessing prevalence [44,45]. Moreover, of the few tools available which can be used to assess risk of bias in prevalence studies, they are generally designed for large population based studies and so cannot be appropriately applied to the studies discussed here [44]. However, considering the broad criteria against which risk of bias can be assessed in prevalence studies, we deemed the risk of bias across these studies to be moderate to high, as samples were not likely to be representative, participants were not randomly selected, and some studies used screening questionnaires rather than diagnostic interviews to assess for mental health conditions, potentially introducing issues of reliability and validity [44].

Comorbidity of substance use disorders with any mental health disorders

Eight studies reported data on the prevalence of any mental health disorders in participants presenting to substance use treatment services [27,33,36,37,39,41–43]. Prevalence estimates for substance use comorbid with any current mental health disorder ranged from 47 to 100% [36,39,41,42], all assessed by diagnostic interviews. One study, also using a diagnostic interview, reported 12 month prevalence of any mental disorder at 76% [27]. Three studies reported lifetime prevalence ranging from 46 to 71% [33,42,43], assessed by reviews of clinical notes [33], diagnostic interviews [42] and self-report questionnaire [43]. A further study reported a prevalence rate of 42% but did not specify whether this was lifetime or

Table 2. *Prevalence of comorbid mood disorders in people with substance use disorders*

Study	Instruments used to measure mood disorders	Time period	Any mood disorder %, *n*	Depression %, *n*	Dysthymia %, *n*	Bipolar %, *n*	Hypomania %, *n*
Baker *et al.* (2004) [35]	BDI-II	Past 2 weeks		85, 181			
Burns *et al.* (2005) [22]	CIDI	Past 12 months	58, 41	55, 39	3, 2		
Callaly *et al.* (2001) [27]	CIDI	Past 12 months	53, 33	34, 21	8, 5	10, 6	2, 1
Cole *et al.* (2008) [37]	Review of clinical notes	Unspecified	31, 51	30, 49	1, 1	1, 1	
Darke *et al.* (1992) [30]	GHQ-28	Past few weeks	59, 141[a]				
Darke *et al.* (1994) [28]	BDI	Past 2 weeks		73, 162			
Deane *et al.* (2013) [38]	ASI	Past month		55[b]			
Dingle *et al.* (2009) [39]	Diagnostic interview for DSM-IV	Current (unspecified)	86, 89	57, 59	11, 11	11, 11	
Dore *et al.* (2012) [40]	Zung Self-Rating Depression Scale	Past few days		60, 149			
Dyer *et al.* (2005), Study 1 [33]	Review of clinical notes	Lifetime		35, 70			
Hood *et al.* (2009), Study B [36]	MINI v5	Past 2 weeks	100[c]	75[c]	75[c]		
Johns *et al.* (2009) [41]	Psychiatric assessment interview	Current (unspecified)	51, 21				
Lubman *et al.* (2007) [42]	Structured Clinical Interview for DSM-IV	Current (unspecified)		27, 27	3, 3	4, 4	
McKetin *et al.* (2011) [34]	CIDI	Past 12 months		40, 158			
Mortlock *et al.* (2011) [43]	Mental Health Screening Form III	Lifetime		79, 215		53, 143	
Ross *et al.* (2005) [29]	CIDI	Past month		29, 219			
Wang *et al.* (2008) [31]	BDI-II	Past 2 weeks		64, 32			
Watson *et al.* (2007) [32]	DASS-21	Past week		76, 40			

[a]Percentage refers to psychiatric 'cases' on the GHQ-28, which includes symptoms of both depression and anxiety. The authors do not provide data on depression prevalence alone. [b]The authors reported that the total *N* is not consistent across variables, and they do not specify the *n* for participants reporting depression. [c]The authors do not specify the *n*s and it is unclear where the percentages have been derived from as the total *N* appears to be inconsistent across variables.

current prevalence, and it assessed the presence of mental health disorders by reviewing the clinical notes of participants accessing inpatient/residential services for any type of substance use [37].

The study with the highest current prevalence rate (100%) used a diagnostic interview (the Mini-International Neuropsychiatric Interview (MINI v5) [46]), and was conducted with individuals receiving outpatient withdrawal care/detoxification for benzodiazepine dependence [36]. However, this study also had the smallest sample size of any study included in the review ($n = 13$), so this particularly high prevalence rate should be interpreted with caution. Nonetheless, four out of the five studies assessing current or 12 month prevalence reported that more than half of people presenting for treatment for substance use disorders also had co-occurring current or 12 month mental health disorders [27,36,39,42].

Comorbidity of substance use with mood disorders

All of the 18 studies included in the review provided some data on the prevalence of co-occurring mood disorders. Table 2 summarises the prevalence of co-occurring mood disorders, with prevalence data for some specific mood disorders (depression, dysthymia, bipolar disorder and hypomania) presented when available.

Table 3. *Prevalence of comorbid anxiety disorders in people with substance use disorders*

Study	Instruments used to measure anxiety disorders	Time period	Any anxiety disorder %, *n*	GAD %, *n*	Panic disorder %, *n*	Agoraphobia %, *n*	PTSD %, *n*	Specific phobia %, *n*	Social anxiety disorder %, *n*	OCD %, *n*	Anxiety other/ unspecified %, *n*
Burns *et al.* (2005) [22]	CIDI	Past 12 months	45, 32	28, 20	3, 2	2, 2			21, 15		
Callaly *et al.* (2001) [27]	CIDI	Past 12 months	68, 42	36, 22	19, 12		31, 19	36, 22		10, 6	
Cole *et al.* (2008) [37]	Review of clinical notes	Unspecified	12, 20		2, 3		1, 1		1, 1	1, 1	7, 11[a]
Darke *et al.* (1992) [30]	GHQ-28	Past few weeks	59, 141[b]								
Darke *et al.* (1994) [28]	STAI	Current (right now)	51, 114								51, 114
Deane *et al.* (2013) [38]	ASI	Past month	70[c]								70
Dingle *et al.* (2009) [39]	Diagnostic interview for DSM-IV	Current (unspecified)	47, 49	20, 21	7, 7	3, 3	5, 5		4, 4	1, 1	11, 11[d]
Dore *et al.* (2012) [40]	TSQ	Past week					45, 109				
Hood *et al.* (2009), Study B [36]	MINI v5	Past 2 weeks	91[e]	75[e]	75[e]	27[e]	66[e]		41[e]	41[e]	
Johns *et al.* (2009) [41]	Psychiatric assessment interview	Current (unspecified)	12, 5								12, 5
Lubman *et al.* (2007) [42]	Structured Clinical Interview for DSM-IV	Current (unspecified)		1, 1	10, 10		27, 27	3, 3	2, 2	1, 1	
Mortlock *et al.* (2011) [43]	Mental Health Screening Form III	Lifetime			76, 209		59, 160	74, 201		52, 143	
Ross *et al.* (2005) [29]	CIDI	Lifetime					43, 320				
Watson *et al.* (2007) [32]	DASS-21	Past week	66, 35								66, 35

[a]Represents psychiatric diagnoses documented as 'anxiety disorder', 'acute anxiety' and 'anxiety' (with no specifier) in clinical notes. [b]Percentage refers to psychiatric 'cases' on the GHQ-28, which includes symptoms of both depression and anxiety. The authors do not provide data on anxiety prevalence alone. [c]The authors reported that the total *N* is not consistent across variables, and they do not specify the *n* for participants reporting anxiety. [d]Represents psychiatric diagnoses recorded as 'anxiety disorder NOS'. [e]The authors do not specify the *n*s and it is unclear where the percentages have been derived from as the total *N* appears to be inconsistent across variables. GAD, generalised anxiety disorder; OCD, obsessive compulsive disorder; PTSD, post-traumatic stress disorder.

Table 4. *Prevalence of comorbid psychotic disorders in people with substance use disorders*

Study	Instruments used to measure psychotic disorders	Time period	Any psychotic disorder %, *n*	Schizophrenia %, *n*	Psychosis other/ unspecified %, *n*
Callaly *et al.* (2001) [27]	CIDI	Past 12 months	5, 3	2, 1	3, 2[a]
Cole *et al.* (2008) [37]	Review of clinical notes	Unspecified	4, 7	2, 4	2, 3[b]
Dingle *et al.* (2009) [39]	Diagnostic interview for DSM-IV	Current (unspecified)	2, 2		2, 2
Dyer *et al.* (2005), Study 1 [33]	Review of clinical notes	Lifetime		7, 13	
Hood *et al.* (2009), Study B [36]	MINI v5	Past 2 weeks	41[c]		41[c]
Johns *et al.* (2009) [41]	Psychiatric assessment interview	Current (unspecified)	10, 4		10, 4
Lubman *et al.* (2007) [42]	Structured Clinical Interview for DSM-IV	Current (unspecified)	3, 3	2, 2	1, 1[d]
Mortlock *et al.* (2011) [43]	Mental Health Screening Form III	Lifetime		36, 97	

[a]Represents participants meeting ICD-10 diagnostic criteria for acute and transient psychotic disorder. [b]Represents psychiatric diagnoses documented as 'paranoia' and 'psychosis' (with no additional specifier) in clinical notes. [c]The authors do not specify the *n*s and it is unclear where the percentages have been derived from as the total *N* appears to be inconsistent across variables. [d]Represents psychiatric diagnoses recorded as 'psychosis NOS'.

Depression was the most frequently assessed disorder, and when other mood disorders were also assessed in the same study, depression was the disorder which occurred most frequently relative to other mood disorders (with the exception of one study that found equal prevalence rates for depression and dysthymia [36]). Current prevalence rates for comorbid depression ranged from 27 to 85%, and 12 month prevalence ranged from 40 to 55%. Two studies reported lifetime prevalence of 35% and 79%. Of the 10 studies reporting current prevalence of depression, eight reported that at least half of their sample was currently depressed.

For dysthymia, current prevalence rates ranged from 3 to 75%, and 12 month prevalence ranged from 3 to 8%. It is worth noting that the study reporting the highest current prevalence rate of 75% had a sample size of 13 [36]; the next highest prevalence rate recorded for dysthymia was 11% [39]. For bipolar disorder, current prevalence ranged from 4 to 11%, one study reported 12 month prevalence of 10%, and one study reported lifetime prevalence of 53%. One study using a review of clinical notes to assess comorbidity reported prevalence rates of 1% for dysthymia and bipolar disorder, but it did not specify whether diagnoses were current or lifetime [37]. Last, the one study assessing hypomania reported 12 month prevalence of 2% [27].

Comorbidity of substance use with anxiety disorders

Fourteen studies provided some data on the prevalence of co-occurring anxiety disorders. Table 3 summarises the prevalence of co-occurring anxiety disorders, with prevalence data for specific types of anxiety disorder [generalised anxiety disorder, panic disorder, agoraphobia, post-traumatic stress disorder (PTSD), specific phobia, social anxiety disorder and obsessive compulsive disorder] presented when available.

Current prevalence rates for co-occurring anxiety disorders as a broad category ranged from 12 to 91%, with 12 month prevalence ranging from 45 to 68%.

All five of the studies assessing generalised anxiety disorder used diagnostic interview methods; current prevalence rates ranged from 1 to 75% and 12 month prevalence ranged from 28 to 36%. One study reported a low current prevalence rate of 1% [42] at a youth outpatient service, but the remaining studies reported current or 12 month prevalence rates of 20% or more [22,27,36,39] in adult clients receiving treatment for a range of substances including alcohol, heroin, benzodiazepines and general substance use.

Of the eight studies assessing PTSD, the lowest prevalence estimate of 1% was found in a study which reviewed patient clinical notes for diagnoses, and did not specify whether the diagnoses were current or lifetime [37]. Four of the five studies assessing current or 12 month prevalence reported that at least a quarter of their sample had comorbid PTSD [27,36,40,42]. Current prevalence estimates for PTSD ranged from 5 to 66%, one study reported 12 month prevalence of 31% and lifetime prevalence ranged from 42 to 59%.

Seven studies assessed panic disorder, with current prevalence rates ranging from 7 to 75%, 12 month

prevalence ranging from 3 to 19% and lifetime prevalence of 76% reported in one study. One study reported a prevalence rate of 2% but did not specify whether this was lifetime or current prevalence [37]. Of the studies assessing current or 12 month prevalence, all but one reported prevalence rates below 20% [22,27,39,42]; the study reporting current prevalence of 75% had a sample size of 13 [36]. Therefore, the more reliable prevalence estimates may come from studies reporting lower prevalence rates as these studies had larger sample sizes and tended to use diagnostic interviews to assess for panic disorder.

For specific phobia, social anxiety disorder, obsessive compulsive disorder and agoraphobia, prevalence rates were generally lower than for generalised anxiety disorder, PTSD and panic disorder. For specific phobia, one study found current prevalence of 3%, one study found 12 month prevalence of 36% and one study found lifetime prevalence of 74%. For social anxiety disorder, current prevalence ranged from 4 to 41%, one study found 12 month prevalence of 21% and one study found prevalence of 1%, but did not specify whether this was current or lifetime. For obsessive compulsive disorder, current prevalence ranged from 1 to 41%, one study found 12 month prevalence of 10% and a further study found lifetime prevalence of 52%. For agoraphobia, current prevalence ranged from 3 to 27%, and one study found 12 month prevalence of 2%. It is worth noting that the highest current prevalence rates for all of these disorders came from a study with a small sample size ($n = 13$) [36], and thus the lower estimates may be more reliable.

Comorbidity of substance use with psychotic disorders

Eight studies provided data on the prevalence of comorbid psychosis (Table 4). On the whole, prevalence rates for psychosis were lower than for mood and anxiety disorders, with current prevalence rates between 2 and 41%, one study reporting 12 month prevalence of 5% and one study reporting lifetime prevalence of schizophrenia at 36%. However, only one study reported a current or 12 month prevalence rate for psychosis over 10%, and this was the small study with the sample size of 13 [36], and thus should be interpreted with caution.

Comorbidity of substance use with other mental health disorders

Eight studies measured mental health disorders other than mood, anxiety and psychotic disorders. Four studies assessed the presence of personality disorders [28,29,39,41], all using diagnostic interviews. Of these, two provided prevalence data for the presence of any personality disorders, with one study reporting current prevalence of 5% [41] and another reporting current prevalence of 26% [39]. Two studies assessed the presence of borderline personality disorder, with one reporting current prevalence of 16% [39] and the other reporting lifetime prevalence of 48% [29]. Three studies assessed antisocial personality disorder (ASPD), with one reporting current prevalence of 2% [39], one reporting 12 month prevalence of 26% [28] and one reporting lifetime prevalence of 72% [29].

Four studies assessed eating disorders, with three studies assessing the presence of eating disorders as a broad diagnostic category [36,39,43] and one study assessing specific types of eating disorder [37]. For the presence of eating disorders generally, two studies reported current prevalence of 2% [39] and 8% [36], both using diagnostic interviews. One study, using a self-report questionnaire, reported lifetime prevalence of 34% [43]. A further study, which used reviews of clinical notes, and did not specify whether its rates referred to current or lifetime prevalence, reported prevalence rates for eating disorders generally at 9%, 4% for anorexia and 4% for bulimia [37]. Last, two studies assessed attention-deficit/hyperactivity disorder, with one reporting current prevalence, assessed by diagnostic interview, of 2% [39] and one reporting lifetime prevalence, assessed by reviews of clinical notes, of 6% [33].

Discussion

Mental health and substance use conditions are highly prevalent in Australia [1], and mental health and substance use conditions frequently co-occur [8]. This review has illustrated that while a significant proportion of people accessing treatment for substance use also have co-occurring mental health conditions, there is considerable variation in the types of disorder, patterns and distributions of comorbid disorders seen across studies.

Despite this variation, the lowest estimate for the current prevalence of any comorbid mental health problem was 47%, suggesting that comorbidity is a significant and serious concern which needs to be addressed by treatment services. In many cases, comorbidity may be the norm rather than the exception in clients presenting for substance use treatment.

Comparing these findings with the prevalence rates reported in the epidemiological literature, it would appear that the rates of comorbidity reported in some treatment-seeking samples are comparable to rates seen in population studies [4,5]. However, a number of studies reported significantly higher comorbidity prevalence rates than the epidemiological literature, which is in line with previous research suggesting that that higher

comorbidity rates may be expected in treatment-seeking samples [8–11]. However, it is challenging to make comparisons between these findings and the broader literature, given the high variation in reported comorbidity prevalence rates not only in the studies reviewed here, but also in the international epidemiological literature [4,5]. Although there is variation in prevalence estimates between epidemiological and clinical research, the patterns of comorbidity observed are consistent, with mood and anxiety disorders appearing to be more prevalent than other types of disorder.

Factors that may influence prevalence estimates

A number of factors may explain the variability in prevalence estimates between studies, including: (i) type of substance use disorder; (ii) type of treatment setting; (iii) method of assessing mental health symptoms; (iv) sample size, representativeness and demographic characteristics.

Type of substance use disorder

As outlined previously, the 18 studies reviewed here included participants who used a range of different substances. However, it is not immediately apparent from the data that there are clear patterns in the prevalence estimates that can be accounted for by type of substance used. For example, heroin users being treated with methadone had relatively low 12 month prevalence rates for depression in one study (34%, [27]) but considerably higher rates in another study looking at current prevalence (73%, [28]). Furthermore, given that seven of the 18 studies included did not focus on any substance type in particular (but rather any substance use that was problematic), it makes interpretation of the data difficult. There is already evidence that certain types of substance use and mental health conditions can be related (e.g. depression and alcohol [47]), but the data reviewed here do not further elucidate the nature of these possible relationships. Therefore, one avenue for future research would involve examining whether particular types of substance use are associated with particular mental health comorbidities, as this knowledge would be of benefit to treatment providers.

Type of treatment setting

The studies in this review were conducted with participants attending a range of treatment services, and it is possible that some services are more likely to see particular patterns of comorbidity than others, possibly as a function of other factors such as type of substance being used by clients, and severity of substance use disorder. However, as with type of substance use disorder, there are no clear patterns in this data indicating that certain types of services are associated with certain patterns of comorbidity in their clients. Considering depression, studies using samples attending outpatient services have current prevalence estimates from 27 to 85%, and studies with inpatient samples have prevalence estimates from 30 to 60%. Outpatient services offering substitution therapies (primarily methadone in the studies included in this review) also have a broad range of prevalence estimates for depression, ranging from 34% (12 month prevalence) to 76% (current prevalence). As such, given the broad and overlapping range of prevalence estimates across different treatment settings, it is not possible to draw any conclusions from these data regarding the extent to which prevalence of comorbidity varies as a function of treatment setting.

Method of assessing mental health symptoms

A range of methods were used to assess for the presence of co-occurring mental health disorders: clinical diagnostic interviews, self-report questionnaires and retrospective reviews of clinical notes. From examining the data, patterns emerge which suggest that measurement method may influence prevalence rates. For depression, while studies using interview methods yielded a reasonably broad range of prevalence rates, studies using self-report screening measures (i.e. BDI, BDI-II, DASS-21, Mental Health Screening Form III, Zung Self-Rating Depression Scale) generally yielded higher prevalence rates for depression, with current prevalence rates ranging from 60 to 85% [28,31,32,35,40]. The self-report measures used in these studies are designed to screen for symptoms of a disorder, and they are not designed to be stand-alone diagnostic instruments. While the psychometric properties vary between instruments, screeners typically overestimate true prevalence and may incorrectly suggest that an individual has a mental health disorder, when a clinical interview or mixed methods approach may not lead to this conclusion [48,49]. Therefore, prevalence estimates generated by studies that only use self-report screening tools should be interpreted with caution.

Moreover, all studies assessed mental health symptoms upon entry to treatment rather than after a period of abstinence. While this illustrates the range of mental health symptoms that individuals may experience when commencing treatment, it is possible that some symptoms may be substance-induced and would not be experienced after a period of reduced usage or abstinence from psychoactive substances. For example, positive symptoms of psychosis could be secondary to drug use and may not indicate the presence of a psychotic disorder [43]. It is recommended that multiple measurements be

undertaken as a person progresses through treatment to monitor symptom change in the absence of substance use [50].

Sample size, representativeness and demographic characteristics

Studies using small sample sizes are less likely to be representative of the target population, and thus prevalence estimates from small studies should be interpreted with caution. For example, the study with the smallest sample size ($n = 13$) generated the highest prevalence rates for comorbid mental health conditions across all studies included in the review, but this sample is clearly not representative [36].

Most of the studies reviewed here used a consecutive sampling method (i.e. where consecutive entrants to treatment were recruited, or all treatment entrants during a specified period were recruited), which is generally considered to provide a good representation of the target sample [51]. However, five studies [28,30,31,35,42] used self-selected samples (e.g. participants recruited via advertisements placed in treatment waiting rooms), which is less likely to be representative of the target population.

Considering demographic characteristics, the majority of the studies did not explore the effects of variables known to be associated with the prevalence of mental health disorders, such as gender, socioeconomic status, culture, and ethnicity [52–54]. Of the seven studies which examined mental health comorbidity prevalence by gender, six studies found gender differences, with women showing higher prevalence rates than men, with the exception of two types of disorder. Specifically, females were more likely to experience current, 12 month, or lifetime depression, anxiety, PTSD, eating disorders, panic disorder and borderline personality disorder [28–30,34,37,42], whereas males were more likely to experience current, 12 month or lifetime psychosis and ASPD [28,29,37]. Only one study found no difference between males and females on prevalence of comorbid current depression and PTSD [40].

Regarding age effects, although all studies collected participant age data, only three reported analyses examining the effect of age on mental health comorbidity: two studies reported that the presence of comorbid mental health conditions did not vary as a function of age [30,40], and one study reported that younger participants were more likely to have ASPD in the preceding 12 months [28].

Of the 18 studies included in the review, 13 studies reported some socioeconomic data (e.g. employment status, education, housing situation, receipt of government financial assistance), whereas five did not report any data of this kind [30,31,36,37,43]. However, none of the studies in the review reported any analyses exploring whether socioeconomic variables had any impact on mental health comorbidity.

Less than half of the studies collected any data on ethnicity or cultural background: Five studies reported the proportion of participants identifying as Aboriginal or Torres Strait Islander (with no other ethnic/cultural data reported) [32,33,35,40,41], one study reported the proportion of participants born outside Australia [34] and one study reported more comprehensive data on participants ethnic background (including the proportion of participants identifying as Aboriginal or Torres Strait Islander) [42]. None of these studies reported any further analyses examining the impact of ethnicity or cultural background on mental health prevalence.

As such, while tentative interpretations of the data reviewed suggest that females accessing substance use treatment may be at greater risk for certain types of comorbid disorders (particularly mood and anxiety disorders), it is not possible to draw any conclusions from these studies regarding the extent to which age, socioeconomic, ethnicity and cultural factors may impact on the prevalence of comorbid mental health disorders in individuals presenting for substance use treatment.

Implications for treatment and future research

The evidence reviewed here indicates that comorbid mental health conditions in people accessing substance use treatment are common. Substance use treatment services should therefore expect the presence of mental health conditions among their clients. It is beyond the scope of this review to comment at length on specific recommendations for treatment and service delivery, but the data synthesised in this review suggest it is important that services routinely assess for comorbid mental health conditions, and consider the way in which services are planned and delivered in light of the high prevalence of comorbidity (e.g. staff training in mental health; how treatments may be adapted to address comorbidity; whether to treat mental health and substance use in an integrated, parallel or sequential fashion [50]). Indeed, the recent shift in the Australian Government's mental health policy recognises the need for individually tailored integrated interventions that target the complex needs of clients with comorbid disorders [55].

Regarding implications for future research, there is a clear need for further high-quality research studies in this area, particularly those that use multimodal assessment of symptoms, and with large, more representative samples. Demographic data should be collected and reported, particularly on factors known to influence mental health, such as gender, age and socioeconomic

status. Future studies should also attempt to identify whether mental health symptoms are substance induced, possibly by assessing mental health after a period of abstinence or reduced use, in addition to assessing at the point of treatment access. Future studies should also attempt to identify any patterns relating to comorbidity for specific types of substances (i.e., whether certain substances are associated with particular mental health conditions), and for specific types of services (i.e. whether particular services are more likely to have clients presenting with particular types of comorbidity).

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