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Methamphetamine Treatment Evaluation Study (MATES): Findings from the Brisbane Site

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METHAMPHETAMINE TREATMENT EVALUATION STUDY (MATES): FINDINGS FROM THE BRISBANE SITE

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EXECUTIVE SUMMARY

Background and aims

Australia has a substantial population of problematic stimulant users, namely dependent, injecting, methamphetamine users. Methamphetamine dependence is associated with serious mental and physical health consequences that include psychological morbidity, methamphetamine-induced psychosis, increased risk of stroke, insomnia, malnutrition, and the risks of blood-borne virus transmission. Over 15,000 Australians present to drug treatment services with methamphetamine use problems each year, and there is concern about the number of dependent users presenting with psychiatric problems like psychosis and depression. Knowledge about people presenting to treatment for methamphetamine and whether treatment is effective is currently limited.

The aims of the current study were to examine:

(i) the characteristics of those entering treatment for methamphetamine dependence, in terms of drug use, criminal involvement, general health functioning, and contact with health services and the criminal justice system;
(ii) rates of psychiatric disorders (i.e., Major Depression, Social Phobia, Panic Disorder, Agoraphobia) and psychotic symptoms among people seeking treatment for methamphetamine dependence;
(iii) treatment outcomes at three and 12 months post-treatment, including changes in drug use, psychiatric morbidity, general health, criminal involvement and HIV risk behaviour; and
(iv) predictors of positive treatment outcomes and whether psychiatric disorders impact on treatment outcomes.

This study forms part of the Methamphetamine Treatment Evaluation Study (MATES), the first longitudinal treatment cohort study of dependent methamphetamine users in Australia. MATES is coordinated by the National Drug and Alcohol Research Centre (NDARC), with a second study site in Brisbane, which was conducted in collaboration with the Queensland Alcohol and Drug Research and Education Centre (QADREC). This report documents the findings from the Brisbane arm of the study.

Method

Methamphetamine treatment entrants (N = 100) were recruited from 15 government and non-government drug treatment services in Brisbane (n = 11) and on the Gold Coast (n = 4). Treatment modalities included in the study were withdrawal management (inpatient and outpatient), residential rehabilitation and counselling. Participants were required to meet the following criteria for inclusion in the study: (i) having entered treatment with methamphetamine (or amphetamine) as the primary or secondary drug of concern; (ii) no meth/amphetamine treatment in the month before treatment; (iii) no inpatient drug treatment in the month before treatment; (iv) no incarceration in the month before treatment; (v) fluency in English; (vi) being aged at least 16 years; and (vii) a willingness to provide contact details for follow-up at three and 12 months. All participants were

volunteers who provided informed consent prior to completing a structured face-to-face interview with the project researcher at baseline.

Methamphetamine treatment entrants were interviewed on entry to treatment (baseline) and at three and 12 months post-treatment entry. A structured interview was used to assess demographics, drug use and psychiatric status. Participants were volunteers who completed informed consent and were reimbursed $30 per interview. Baseline interviews took approximately 1.5 hours and were conducted face-to-face, while follow-up interviews were conducted either face-to-face or by phone and took around one hour to complete.

Baseline measures included: demographics; mental health history; drug use history; methamphetamine use and other drug use in the month before treatment; a past year DSM-IV diagnosis of Major Depression, Social Phobia and Panic Disorder (with or without Agoraphobia); lifetime psychosis; current symptoms of psychosis and hostility; HIV risk-taking behaviour; and crime.

The three month follow-up interview re-assessed methamphetamine and other drug use, symptoms of psychosis and hostility, HIV risk-taking behaviour and crime. The 12 month interview re-assessed these same variables, and also re-assessed past year DSM-IV diagnoses of Major Depression, Social Phobia and Panic Disorder (with or without Agoraphobia). Lifetime DSM-IV diagnoses of Schizophrenia and Mania were assessed at three and 12 month interviews respectively.

Methamphetamine outcome measures were assessed using the Opiate Treatment Index. DSM-IV diagnoses of Axis I psychiatric disorders were assessed using the Composite International Diagnostic Interview. Substance-Induced disorders were defined as those disorders where the symptoms were always the result of medication or substance use. Lifetime psychosis was assessed using Jablensky's Psychosis Screen. Current symptoms of psychosis and hostility were assessed using the Brief Psychiatric Rating Scale.

Descriptive comparisons at each time point were undertaken using the Kruskal-Wallis tests for continuous variables and Pearson's Chi-Square tests for categorical variables. Pair-wise comparisons were made between measures at each respective follow-up interview and baseline using the Wilcoxon test for continuous variables, the McNemar test for dichotomous variables, and the Marginal Homogeneity test for multinomial categorical variables.

Results

Characteristics of the sample at baseline

Participants were enrolled in residential rehabilitation (n = 55), withdrawal management (n = 29) or counselling (n = 16). They tended to be male (72%), single (71%) and in their late twenties (median age 27). Most were unemployed (86%), and they were mainly living with non-related adults (33%) in rental accommodation (44%), or with their parents (24%) or partners (23%). The majority had been previously diagnosed with a

mental health problem, most commonly depression or anxiety. Twenty-six per cent had been to prison and 69% had an arrest history.

Participants had long histories of drug use. They first became intoxicated at around 13 years of age (typically with alcohol or cannabis) and they had used a median of 10 drug classes in their lifetime (including methamphetamine). Their first methamphetamine use occurred when they were about 17 years old, and most (80%) began injecting it, at around 18 years of age. The onset of dependence occurred at a median age of 20 years and, at the time of recruitment to the study, participants had been using methamphetamine for a median of 10 years.

All participants met DSM-IV criteria for methamphetamine dependence in the past year. Participants were typically injecting base (41%) or crystal (46%) methamphetamine twice per day, and they had used on a median of 16 days in the past month. Polydrug use was common, with notably high levels of tobacco, cannabis and alcohol consumption. Use of ecstasy and benzodiazepines, although common, was less frequent.

Prevalence of DSM-IV Disorders

Major Depression: the prevalence of Major Depression was 44%. A further 45% had Substance-Induced Major Depression. Suicidal ideation was common and one in five had attempted suicide in the past year.

Social Phobia: the prevalence of Social Phobia was 31% in the past year. A further 22% had Substance-Induced Social Phobia during this time.

Panic Disorder (with or without Agoraphobia): 31% met DSM-IV criteria for Panic Disorder in the past year, of whom 58% had symptoms of Agoraphobia. Ten percent had Substance-Induced Panic Disorder in the past year.

Psychosis and hostility

Lifetime psychosis: most treatment entrants had experienced an episode of psychosis in their lifetime (83%), irrespective of whether they had been previously diagnosed with a chronic psychotic disorder (i.e., Mania, Bipolar Disorder, Schizophrenia or Schizoaffective Disorder, 100% vs. 78%).

Past month symptoms of psychosis: almost half the sample (47%) had experienced a clinically significant symptom of either suspiciousness, unusual thought content or hallucinations in the month before treatment. Twenty-nine per cent reported clinically significant suspiciousness, 27% reported clinically significant unusual thought content (i.e., delusions), and 23% reported clinically significant hallucinations.

Hostility: three quarters of the sample reported clinically significant levels of hostility in the month before treatment.

Treatment outcomes

Follow-up rates were similar to other major international treatment outcome studies: 81% of participants were followed up at three months and 75% were followed up at 12 months post-treatment entry. Treatment outcomes at both time points were very positive despite participants' pre-treatment drug use levels, psychiatric comorbidity, criminal involvement, and HIV risk behaviour.

Methamphetamine and other drug use

There were marked reductions in all measures of methamphetamine use at both three and 12 month follow-up in comparison with pre-treatment levels. There were no increases in polydrug use at follow-up. There were reductions in the use of most illicit drugs, but the use of licit drugs did not decrease.

Abstinence from methamphetamine: 61% of the sample was abstinent from methamphetamine at three month follow-up (cf. 2% at baseline, $p < 0.001$). Abstinence levels were sustained at 12 month follow-up (61%, $p < 0.001$).

Dependence on methamphetamine: 26% of participants met DSM-IV criteria for methamphetamine dependence at three month follow-up (cf. 100% at baseline, $p < 0.001$), with the proportion remaining low at 12 month follow-up (29%, $p < 0.001$).

Psychiatric comorbidity

Overall, there was a drop in the proportion of the sample who met criteria for the comorbid psychiatric disorders (including Substance-Induced disorders) measured in this study.

Major Depression: while the prevalence of Major Depression was the same as baseline at 12 month follow-up (44%), there was a significant decrease in the prevalence of Substance-Induced Major Depression (16% cf. 47% at baseline, $p < 0.001$).

Social Phobia: significant reductions in the prevalence of Social Phobia were found at 12 month follow-up compared to baseline (9% cf. 33% at baseline, $p < 0.001$). The prevalence of Substance-Induced Social Phobia also decreased (5% cf. 27%, $p = 0.001$).

Panic Disorder: there were non-significant trends toward reductions in the prevalence of Panic Disorder and Substance-Induced Panic Disorder at 12 month follow-up compared to baseline (20% cf. 32% and 5% cf. 12% respectively). Conversely, there was a significant increase in the proportion of participants who did not meet criteria for either Panic Disorder or Substance-Induced Panic Disorder at 12 month follow-up (56% cf. 75%, $p = 0.014$).

Psychosis and hostility

Symptoms of psychosis and hostility decreased significantly at both three and 12 month follow-up in comparison with pre-treatment levels. The proportion reporting any clinically significant symptom of suspiciousness, unusual thought content or hallucinations decreased to 23% at three month follow-up and 19% at 12 month follow-

up (cf. 47% at baseline $p < 0.01$). The prevalence of past month hostility reduced significantly to 40% at three months, and 41% at 12 months (cf. 75% at baseline, $p < 0.001$).

Conclusion

The current study found that methamphetamine treatment entrants respond very well to treatment that is already being provided in the general community. Participants showed considerable reductions in drug use and the majority had ceased methamphetamine use altogether by their final follow-up. Nonetheless, this sample had extraordinary levels of psychiatric comorbidity at baseline, with clinical levels of depression and symptoms of psychosis being prevalent among the group. Although substance-induced psychiatric symptoms abated by the end of the study, a significant proportion was still experiencing comorbidity, particularly Major Depression, suggesting that supplementary treatment for comorbidity is required to maximise longer-term treatment outcomes.

1 INTRODUCTION

1.1.1 Background

Australia has a substantial population of problematic stimulant users, namely dependent, injecting methamphetamine users, with methamphetamine injection accounting for one-third of all injecting drug use in Australia (National Centre in HIV Epidemiology and Clinical Research, 2006). Methamphetamine dependence is associated with serious physical and mental health problems and there is concern that an increasing number of methamphetamine users are presenting for treatment with psychiatric problems. There is currently limited knowledge about people presenting for methamphetamine treatment or whether the treatment they receive is effective. This study aims to find out about the characteristics of people seeking treatment for methamphetamine dependence, their psychiatric comorbidity, and whether the treatment they receive is effective in reducing their drug use and related problems, and improving their mental health status.

Extent of methamphetamine use in Australia

Almost one in ten Australian's have tried 'amphetamines' in their lifetime, making amphetamines the second most commonly used illicit drug in Australia after cannabis. Methamphetamine accounts for almost all of the drugs sold and used in Australia under the more generic name of 'amphetamines', also known by the street names of 'ice', 'crystal', 'shabu', 'base', or 'speed'[1]. The use of methamphetamine has increased among the general population over the past decade, with a particularly notable trend in the increase of use among sentinel drug-using populations like injecting drug users, and among drug users in the party drug scene. The Australian Illicit Drug Reporting System found the proportion of injecting drug users surveyed in Sydney who had recently taken methamphetamine rose from 35% in 1998 to 62% in 2007, while use of the drug was also high among injecting drug users in other major Australian cities (recent use ranged between 68% and 88% in 2007) (Black et al., 2008). More importantly, the proportion who had recently used the high purity crystalline form of the drug, 'ice' or 'crystal', rose from 14% in 2000 to 50% in 2007 in Sydney, with similar increases seen in several other major cities in Australia (Black et al., 2008). This form of the drug has been associated with particularly adverse health consequences such as drug-induced psychosis (Degenhardt & Topp, 2003) and increased levels of dependence (McKetin et al., 2006a).

Health effects of methamphetamine use

Methamphetamine has a defined dependence syndrome (Topp & Mattick, 1997a) characterised by affective and physical withdrawal symptoms, users taking the drug to relieve withdrawal, and rapid reinstatement of use following periods of abstinence. Withdrawal is characterised by fatigue, craving and psychological distress (lethargy, irritability, depression, anxiety, circadian disturbances, difficulty concentrating), and physical complaints (decreased appetite, sweating, weakness, perceptual disturbances, body aches). Methamphetamine use has also been associated with serious mental and

[1] To be concise, methamphetamine hereafter refers to both methamphetamine and amphetamine, and refers to all illicit drugs sold under the street names 'base', 'ice', 'crystal' or 'crystal meth', and 'speed'.

physical health consequences including methamphetamine-induced psychosis, psychological morbidity, cognitive dysfunction, a four-fold increased risk of stroke, malnutrition and insomnia, as well as a risk of HIV and other blood-borne virus transmission among injecting users (Darke et al., 2008; Hall et al., 1997; Kaye et al., 2007; Margolis et al., 1971; McKetin et al., 1998; McKetin et al., 2006b; Petitti et al., 1998).

Impact of methamphetamine use on treatment services

The increased use of methamphetamine in Australia over recent years has had a marked impact on health services and the criminal justice system (McKetin & McLaren, 2004). The number of hospital admissions for stimulant induced psychosis in Australia increased significantly from 1999–2000 to 2004–2005 (Degenhardt et al., 2007), while the number of people receiving treatment for methamphetamine in 2001 was double that seen in the early to mid 1990s (Shand & Mattick, 2002). In the 2005/06 financial year, there were 15,935 drug treatment episodes in Australia where methamphetamine was the primary drug of concern. Counselling was the most common form of treatment provided (39%), followed by withdrawal management (13%) and residential rehabilitation (14%) (Australian Institute of Health and Welfare, 2007). Despite the increasing burden of methamphetamine on public health facilities, particularly drug treatment facilities, there is no established best practice model for treating methamphetamine dependence, with few well-controlled evaluations of treatment protocols among this group (Baker et al., 2004). Moreover, treatment modalities for this group are varied and not clearly defined in practice, and there has been no research on whether the treatment that is provided in everyday practice in Australia is effective in reducing methamphetamine use and related health problems.

Current treatment outcomes research

Major research studies on treatment outcome internationally and in Australia do not provide substantive information on treatment outcomes for methamphetamine dependence. This is simply because methamphetamine dependence is not sufficiently common among the treatment cohorts being studied. The two major treatment outcome cohort studies completed internationally are the Drug Abuse Treatment Outcome Study (DATOS) in the United States of America (Hubbard et al., 2003) and the National Treatment Outcome Research Study in the United Kingdom (NTORS) (Gossop et al., 2000). Only 3% of the DATOS treatment cohort reported amphetamines as their primary drug problem. Unsurprisingly, there are few published reports on treatment outcome for methamphetamine use arising from the DATOS study (Riehman et al., 2002). The NTORS study examined treatment outcomes for amphetamine use under the broader banner of psychostimulant use, with the majority of this sub-sample consisting of crack cocaine users (59%), of whom most (95%) reported heroin rather than psychostimulants as their main drug problem (Gossop et al., 2000). Therefore it is difficult to make inferences about treatment effectiveness for methamphetamine dependence based on reports from the NTORS study. The Australian Treatment Outcome Study was unable to provide information on the effectiveness of treatment for methamphetamine dependence because the cohort included only those receiving treatment for heroin dependence (Darke et al., 2007).

Mental health among dependent methamphetamine users

An important issue in treating methamphetamine dependence is psychiatric comorbidity. Methamphetamine users in Australia are at over three times the risk of psychiatric hospital admissions than their opioid-using counterparts (Bartu et al., 2003). Affective disorders are particularly common among those seeking treatment. A retrospective review of methamphetamine treatment client records of an outpatient program in California showed that 49% had a psychiatric diagnosis noted on their client records, with mood disorders being most common (71%), particularly major depression (57%), while anxiety disorders accounted for 27% of diagnoses (Copeland & Sorensen, 2001). Surveys of out-of-treatment methamphetamine users in Australia have also found levels of psychological distress indicative of psychiatric problems, with 44% being classified as likely 'cases' using the General Health Questionnaire (Hall et al., 1996). In addition to affective disorders and high levels of general psychological morbidity, methamphetamine users are at risk of drug-induced acute paranoid psychosis (Connell, 1958). Self-report of paranoid psychotic symptoms is common among regular users of the drug, with 52% of those surveyed by Hall et al. (1996) having experienced paranoia, and 46% hallucinations, subsequent to the onset of their use of amphetamines. More recently, McKetin et al. (2006b) found that 23% of a community sample of regular methamphetamine users had experienced a clinically significant symptom of psychosis in the past year. It is important to establish the extent of psychiatric disorders that would warrant referral and further treatment. Moreover, it is important to consider whether treatment for drug use affects psychiatric morbidity or conversely whether psychiatric morbidity impacts on the effectiveness of drug treatment among this population.

1.2 Aims of the current study

The current study is a component of a larger treatment outcomes study for methamphetamine use in Australia, the Methamphetamine Treatment Evaluation Study (MATES). The aim of MATES was to conduct the first longitudinal treatment cohort study of dependent methamphetamine users in Australia. Specifically, the study examined:

(i) the characteristics of those entering treatment for methamphetamine dependence, in terms of drug use, criminal involvement, general health functioning, and contact with health services and the criminal justice system;

(ii) rates of psychiatric disorders (i.e., Major Depression, Panic Disorder, Agoraphobia, Social Phobia) and psychotic symptoms among people seeking treatment for methamphetamine dependence;

(iii) treatment outcomes, including changes in drug use, psychiatric morbidity, general health, criminal involvement and HIV risk behaviour; and

(iv) predictors of positive treatment outcomes, including whether psychiatric disorders impact on treatment outcomes.

The Brisbane arm of MATES involved recruiting 100 people on entry into drug treatment services in the Brisbane and Gold Coast regions who nominated methamphetamine (or amphetamine) as their primary or secondary drug of concern. Treatment modalities included in the study were counselling, residential rehabilitation

and withdrawal management. Participants were followed-up three and 12 months post-treatment entry to assess changes in drug use, psychiatric morbidity and other harms, relative to pre-treatment levels.

2 METHOD

2.1 Participants and procedure

Methamphetamine treatment entrants (N = 100) were recruited from 15 drug treatment services in Brisbane and on the Gold Coast. Drug treatment services targeted for inclusion in the recruitment process were selected from government and non-government organisations that submit data to the Alcohol and Other Drug Treatment Services National Minimum Dataset (AODTS-NMDS) (Australian Institute of Health and Welfare, 2007). Treatment modalities included in the study were withdrawal management, counselling and residential rehabilitation, as defined by the National Minimum Dataset Data Dictionary and Collection Guidelines (Australian Institute of Health and Welfare, 2003). All agencies approached agreed to participate in the study. These included three withdrawal management services (two inpatient services and one outpatient), four residential rehabilitation services and eight counselling services. Eleven drug treatment services were located in Brisbane, and the remaining four were located on the Gold Coast.

Inclusion criteria for participation were: (i) having entered drug treatment with methamphetamine or amphetamine as the primary or secondary drug of concern; (ii) no treatment for meth/amphetamine use in the month prior to the current treatment episode; (iii) no inpatient drug treatment in the month prior to treatment; (iv) no incarceration in the month prior to the treatment episode; (v) fluency in English; (vi) being aged 16 years or over; and (vii) a willingness to provide contact details to facilitate follow-up interviews at three and 12 months. Eligibility criteria (ii), (iii) and (iv) were included so that participants' typical patterns of drug use were reflected in the baseline data. Criterion (v) was included because the main diagnostic measures used in the study have been validated among English-speaking populations.

Drug treatment providers approached potentially eligible clients about the study, screened them for eligibility, and obtained their consent to be contacted by the project researcher. This procedure was tailored to suit the particular operational structure of each service. To cover the time and administration involved in undertaking this task, a reimbursement of $20 per participant referral was proffered to treatment agencies. The project researcher then briefed the potential participant about the study, confirmed eligibility and invited their participation. In total, 111 drug treatment clients were screened for eligibility to the study by the project researcher, of whom 100 were eligible for participation. Of the remaining 11 clients, ten were ineligible due to having been in drug treatment (46%, n = 5) or incarcerated (46%, n = 5) in the month prior to commencing the baseline treatment episode. One person (9%) declined participation. This does not include participants who were not referred to the study.

All participants were volunteers who provided informed consent prior to the baseline interview. A structured face-to-face questionnaire was administered by the project researcher as soon as possible after entry into treatment. Interviews took approximately 1.5 hours to complete and took place at inpatient drug treatment centres or at a location

convenient to the participant, such as a cafe, shopping centre or park. Participants were recontacted and reinterviewed at three months and 12 months post-treatment entry. Three and 12 month follow-up interviews took place either face-to-face or over the telephone, and took approximately one hour to complete. Locator information was updated at each time point. Each participant was reimbursed $30 per interview to cover their time and travel expenses.

The project was granted ethics approval by the University of New South Wales Human Research Ethics Committee and the University of Queensland Medical Research Ethics Committee. In order to recruit participants from Queensland Health drug treatment services, further ethical clearances were obtained from The Prince Charles Hospital Health Services District Human Research Ethics Committee and the Princess Alexandra Hospital Human Research Ethics Committee.

2.2 Measures

2.2.1 Baseline measures

Treatment history

The current treatment episode for methamphetamine was categorised according to the AODTS-NMDS (AIHW, 2007) as being: (i) withdrawal management (inpatient or outpatient), (ii) residential rehabilitation or (iii) counselling. Information was also recorded on whether the participant completed drug detoxification prior to entering residential rehabilitation and counselling, and if so, the number of days spent detoxifying, and detoxification type (inpatient, outpatient or unassisted withdrawal). General treatment history measures included: (i) lifetime treatment exposure for any alcohol or other drug use, (ii) age of first treatment for any alcohol or other drug use, (iii) drug first received treatment for, and (iv) treatment modality first received.

Demographics

Demographic measures included age at treatment intake, sex, years of completed secondary schooling, current employment status, main source of income in the past month and net income earned in the past fortnight. Also included were living arrangements in the month before treatment (alone, with partner, with children, with parents, or with non-related adults), main form of accommodation in the past month (public housing, privately rented premises, privately owned premises, parent's home, boarding house/hostel/refuge, drug treatment residence, no fixed address), current marital status (single, married/de facto, separated, divorced, widowed), current parenting status (ever had children, currently living with dependent children) and prison history. Self-reported lifetime mental health diagnoses (mania or bipolar disorder, schizophrenia, drug-induced psychosis, other psychosis, depression, anxiety disorder and ADHD) and lifetime psychoactive medication prescription (benzodiazepines, antidepressants, antipsychotics, and other psychoactive medications) were also measured.

Methamphetamine and other drug use

Drug use history measures included current drug of choice, age of first intoxication, age of first methamphetamine use and age of first methamphetamine injection. The Opiate Treatment Index (OTI) (Darke et al., 1991) was used to measure methamphetamine abstinence, days of methamphetamine use, and the average number of methamphetamine use occasions per day, in the four weeks before treatment. Other methamphetamine use measures in the month before treatment included main route of administration and main form of methamphetamine used (crystalline methamphetamine or 'ice', damp/oily methamphetamine or 'base', powder methamphetamine or 'speed', and other forms). The Composite International Diagnostic Interview (CIDI) was used to assess a DSM-IV diagnosis of methamphetamine Abuse and methamphetamine Dependence in the past year (Janca et al., 1992).

Severity of dependence for methamphetamine, cannabis, alcohol and heroin in the month before treatment was measured using the Severity of Dependence Scale (SDS) (Gossop et al., 1995). Other measures of drug use included: (i) lifetime, past year, and past month use of all major drug types, (ii) lifetime and past year injection of all injectable drug types, (iii) past year frequency of use of all drug types (no use, less than weekly, weekly, twice weekly, three to four days per week, and five or more days per week), and (iv) days of use in the past month for all drug types.

Comorbid psychiatric disorders: Major Depression, Social Phobia and Panic Disorder

DSM-IV diagnoses of Major Depression, Social Phobia and Panic Disorder (with or without Agoraphobia) in the past year were measured using the Composite International Diagnostic Interview (CIDI) (Janca et al., 1992). Among participants who met criteria for Panic Disorder (with or without Agoraphobia), symptoms of Agoraphobia were measured using an abridged version of the CIDI Agoraphobia section. The DSM-IV criteria for Major Depression, Social Phobia, Panic Disorder (with or without Agoraphobia) can be found in Appendix 1. 'Substance-Induced' diagnoses were defined as having met DSM-IV criteria for the disorder with the exception that symptoms were always due to the use of medication, drugs or alcohol. In these situations, the criteria for symptom duration and functional impairment may not have been met. Diagnoses did not exclude symptoms better accounted for by other Axis I disorders.

Participants who met criteria for a disorder were subsequently asked whether they had received help for that disorder in the past year, and if so, from where, and whether they thought that they had received enough help. If participants had not received help for the disorder in the past year, they were asked whether they thought that they needed help.

Lifetime psychosis

The lifetime prevalence of psychosis was measured using Jablensky's Psychosis Screen. The Psychosis Screen includes five items that target specific psychotic symptoms: (i) delusional mood; (ii) grandiose delusions; (iii) delusions of control, thought interference or passivity; (iv) delusions of reference or persecution; (v) hallucinations; and a further item that assesses whether the person has been told by a doctor that they may have Schizophrenia, Mania or Bipolar Disorder. A seventh item records the interviewer's

clinical judgement on whether psychotic symptoms have ever been present. Participants screened positive for lifetime psychosis if they were positive on at least two items (Jablenksy et al., 2000). The Psychosis Screen was scored based on participant's self-reported symptoms rather than the interviewer's rating of whether symptoms were present.

Current psychotic symptoms and hostility

Symptoms of psychosis and hostility in the month prior to treatment entry were measured using the Brief Psychiatric Rating Scale (BPRS) (Lukoff et al., 1986) items of suspiciousness, unusual thought content, hallucinations, and hostility. The BPRS is used widely to track psychiatric symptom severity over time in longitudinal research, and it has good inter-rater reliability (0.83) when administered by lay clinicians (Lukoff et al., 1986). The BPRS yields symptom severity scores from 1 to 7. Scores of 4 or more reflect pathological or clinically significant symptoms, and scores of 6 to 7 reflect severe symptoms that would warrant hospitalisation. Symptoms were defined as a score of 4 or more on each subscale. Having had any psychotic symptom in the month before treatment was defined as having a score of 4+ on any of the three psychosis items (suspiciousness, unusual thought content or hallucinations).

General mental and physical health

Physical and mental health in the month before treatment was measured using the Short Form 12 (SF-12) (Ware et al., 1995; Ware et al., 1996). The SF-12 yields two scores: the Physical Component Scale, a measure of physical functioning; and the Mental Component Scale, a measure of mental functioning. The scale yields a mean normative score of 50 (standard deviation = 10) and lower scores on each scale represent worse health (Sanderson & Andrews, 2002). The current study defined impaired health as a score of more than one standard deviation below the normative mean (i.e., < 40), which corresponds to Sanderson and Andrew's definition of moderate to severe disability.

Psychological distress

Psychological distress in the month prior to treatment entry was measured using the Kessler Psychological Distress Scale (K-10) (Kessler et al., 2000), which has been shown to have good validity and moderate reliability (Andrews et al., 2001). Scores on the K-10 range from 0 to 50, with higher scores reflecting higher levels of psychological distress (Kessler et al., 2002). Levels of psychological distress on the K-10 were categorised as low (scores of 0–15), moderate (scores of 16-29) and high (scores of 31+), whereby moderate and high categories suggest a need for further assessment and possibly intervention (Andrews & Slade, 2001).

HIV risk behaviour

The HIV Risk-taking Behaviour Scale of the OTI (Darke et al., 1991) was used to measure HIV risk taking. Additional questions were included to measure the number of unprotected sex partners in the month before commencing treatment. All risk behaviour was measured in the month prior to treatment, and the main outcome measures were: (i) borrowing or loaning a used needle or syringe, (ii) number of different sex partners, (iii) unprotected sex with more than one partner, and (iv) unprotected sex with casual

partners. Participants were also asked to indicate all of the places from which they had sourced sterile injecting equipment in the month before treatment.

Criminal involvement

The Crime Scale of the OTI (Darke et al., 1991) was used to measure participants' criminal involvement in the month before treatment entry. The OTI Crime Scale assesses crime in four areas: property crime, drug dealing, fraud, and violent crime. Property crime included shoplifting, stealing, receiving stolen goods, and break and enter. Drug dealing included any sale of illicit drugs. Fraud included crimes such as social security scams or cash in hand work, cheque or prescription forgery, and using someone else's credit card. Violent crime included any crime that involved violence, such as assault, violence in a robbery, and armed robbery.

2.2.2 Three month measures

Treatment exposure

Treatment measures at three months included: (i) modality of baseline treatment (i.e., counselling, withdrawal management and residential rehabilitation); (ii) days spent in baseline treatment; (iii) retention in baseline treatment (i.e., retained for at least the median duration of treatment for each treatment modality); (iv) non-completion of baseline treatment; (v) number of subsequent treatment episodes commenced; and (vi) total number of days spent in any treatment between baseline and the three month follow-up interview.

Demographics

Demographic measures updated at three months included: employment status, main source of income in the past month, income earned in the past fortnight, accommodation and living arrangements in the past month, and whether participants were currently living with dependent children.

Methamphetamine and other drug use

The OTI was used to measure methamphetamine abstinence, days of methamphetamine use, and the average number of methamphetamine use occasions per day, in the past four weeks. Past month DSM-IV diagnoses of methamphetamine Abuse and Dependence were assessed using the CIDI. Severity of dependence on methamphetamine, cannabis, alcohol and heroin in the past month was measured using the SDS. Other drug use measures included: (i) days of use in the past month, and (ii) frequency of use since the previous interview (no use, less than weekly, weekly, twice weekly, three to four days per week, and five or more days per week), for all drug types.

Other outcome measures

Other variables reassessed at the three month interview were psychotic symptoms (BPRS subscales of suspiciousness, unusual thought content, hallucinations and hostility), HIV risk behaviour, criminal involvement, general mental and physical health, and psychological distress. All of these measures pertained to the past month.

Schizophrenia and Conduct Disorder

Two additional lifetime psychiatric diagnoses were obtained at three months: a DSM-IV diagnosis of Schizophrenia was assessed using the CIDI, and a retrospective DSM-IV diagnosis of Conduct Disorder was measured using an adaptation of the Diagnostic Interview Schedule (Robins et al., 1981; Darke et al., 1998). The diagnosis of Schizophrenia excluded the symptoms of disorganised speech, grossly disorganised or catatonic behaviour, and negative symptoms (e.g., alogia, affective flattening, avolition) because they could not be assessed accurately through self-report (see Appendix I for diagnostic criteria).

2.2.3 Twelve month measures

Treatment exposure

For each treatment episode initiated since the previous interview, information was obtained on the modality of treatment (i.e., withdrawal management, counselling, residential rehabilitation) and days spent in the treatment. These measures were combined with data from the three month interview to determine the total number of treatment episodes started and the total number of days in treatment since entry into the study.

Other outcome measures

Demographics, drug use and other outcome measures (psychotic symptoms, crime, HIV risk behaviour, general mental and physical health, and psychological distress) in the past month were re-assessed at the 12 month follow-up interview. Past year DSM-IV diagnoses of Major Depression, Social Phobia and Panic Disorder (with or without Agoraphobia) were reassessed using the CIDI. A lifetime DSM-IV diagnosis of a Manic Episode was also derived using the CIDI (see Appendix 1 for diagnostic criteria).

2.2.4 Statistical analysis

Most outcome and descriptive measures in the study were not normally distributed, and could not be normalised adequately using logarithmic transformations. For this reason, medians and ranges, rather than means and variance measures, have been reported. Descriptive group comparisons were made at baseline using Kruskal-Wallis tests for continuous variables, and Pearson's Chi-Square tests for categorical outcomes. Changes between baseline and outcome measures at three and 12 months were assessed using the Wilcoxon test for continuous variables, McNemar's test of symmetry for dichotomous variables, and an exact form of the Marginal Homogeneity test for multinomial variables.

The relationships between treatment predictors (demographics, drug use, treatment exposure measures and psychiatric comorbidity) and methamphetamine abstinence at 3 and 12 months were examined using Pearson's Chi-Square tests.

All tests were two-sided. Significant effects were designated as those where the probability of a type-one error rate was below 0.05 (i.e., $p < 0.05$). Significance values < 0.10 are presented in tables to allow inspection of trends that did not reach statistical significance.

3 BASELINE RESULTS

3.1.1 Treatment history

Of the 100 participants recruited at baseline, 55 were in treatment at a residential rehabilitation centre, 29 were enrolled in withdrawal management (22 were attending inpatient withdrawal and seven were enrolled in outpatient withdrawal), and 16 were attending drug counselling. The median lag between treatment entry and the interview date was eight days (range 0 to 32 days).

Over half (55%) of the sample reported that they had been in previous formal treatment for their alcohol or other drug use during their lifetime. The median age of participants' first treatment episode was 23 years (range 16 to 44 years). Fifty-three per cent (n = 29) of participants with a drug treatment history reported that their first treatment episode was for methamphetamine use. Other drugs that participants had first sought treatment for included heroin (16%, n = 9), cannabis (9%, n = 5) and alcohol (7%, n = 4). The most common treatment modalities first accessed by participants with a drug treatment history were inpatient withdrawal management (31%), residential rehabilitation (29%), and counselling (24%).

3.1.2 Demographics

Participants (N = 100) had a median age of 27 years (range 17 to 49 years) and almost three-quarters (72%) were male. Most (93%) were born in Australia and all spoke English as their first language. The sample had completed a median of 10 years school education (range 7 to 12 years), almost half (47%) had completed a trade or technical qualification, and 8% had completed a university degree. The majority (86%) of participants were unemployed in the month before entering treatment, and their median fortnightly income was $480 (range $0 to $7,000) (Table 1).

A privately rented house or flat (44%) was the most common form of accommodation in the month prior to treatment, followed by their parent's home (25%). Eleven per cent were homeless and four per cent were living in a boarding house or hostel, with a further three per cent residing in other forms of temporary accommodation (e.g., staying with relatives/friends) (Table 1). In the month before entering treatment, one-third of the sample lived with non-related adult flatmates. Similar proportions reported living with their parents (24%) or their partner (23%). Nearly three-quarters (71%) of participants were single at baseline. Only a small proportion (15%) was living with dependent children before they entered treatment.

Over two-thirds (69%) had ever been arrested and 26% had been to prison. A median of 5 years and 9 months (range 4 to 396 months) had lapsed since their most recent release from prison.

Most participants had received a mental health diagnosis from a doctor at some point in their lifetime, most commonly for depression (65%) or anxiety (45%). Over a third (34%) reported that a doctor had told them that they had a drug-induced psychosis.

Smaller proportions had been told that they had Attention Deficit Hyperactivity Disorder (ADHD) (17%), Mania or Bipolar Disorder (10%), or Schizophrenia (8%). Over two-thirds (68%) of the sample reported having been prescribed antidepressants, half benzodiazepines, and over a third (34%) antipsychotic medication. Twenty per cent had been prescribed 'other' psychoactive medication in their lifetime, such as anticonvulsants or mood stabilizers (e.g., sodium valporate, lithium).

Table 1. Demographic characteristics of the sample at baseline

	N = 100
Sex (% male)	72
Age (median years)	27
Born outside Australia (%)	7
Schooling (median years)	10
Tertiary education (%)	55
Unemployed (%)	86
Net income in the past fortnight (median AU$)	$455
Arrest history (%)	69
Prison history (%)	26
Living arrangements[a] (%)	
Alone	18
Partner/spouse/de-facto (with or without children)	23
Parents	24
Non-related adults	33
Siblings	12
Housing (%)	
Public	2
Privately rented	44
Privately owned	11
Parent's home	25
Boarding house	4
No fixed address	11
Other people's homes	3
Marital status (%)	
Single	71
Married or defacto	19
Separated/divorced	10
Living with dependent children (%)	15

Note: Living arrangements and housing pertain to the month prior to treatment entry.
[a]Participants could endorse more than one category

3.1.3 Drug use

Drug use history

The median age of first intoxication among participants was 13 years (range 2 to 19 years); alcohol (60%) and cannabis (28%) were the most commonly used intoxicants on this occasion. Most participants reported that methamphetamine was their drug of choice (81%). First methamphetamine use occurred at a median age of 17 years (range 11 to 44 years). A history of drug injection was reported by the majority of participants (84%), and initiation to injection occurred at a median age of 18 years (range 12 to 33 years). Eighty per cent (n = 67) of the injecting group reported that methamphetamine was the first drug they injected, with other drugs first injected including heroin (13%), cocaine (4%) and other opiates (4%).

Methamphetamine use

The median duration of participant's methamphetamine using career was 10 years (range 1 to 33 years). All participants met DSM-IV criteria for Dependence on methamphetamine in the past year. The median onset of Dependence was 20 years of age (range 13 to 45 years): a median of three years subsequent to their first use (range < 1 year to 26 years). Participants had a median Severity of Dependence Scale score of 10 (range 0 to 15), suggesting that they were severely methamphetamine dependent in the month prior to treatment entry.

Participants typically reported heavy methamphetamine use: 80% reported using methamphetamine at least three to four times weekly in the past year; 43% reported using the drug on five or more days per week. In the month prior to treatment entry, participants reported using methamphetamine a median of two times per day, and they had used on a median of 16 days (range 0 to 28) (Table 2).

Sixty-nine per cent of the sample reported that injection was their main route of methamphetamine administration in the month before treatment. Nineteen per cent reporting smoking as their main route. Swallowing (10%) or snorting (1%) methamphetamine was less popular.

Crystalline methamphetamine and 'base' methamphetamine were the main forms of methamphetamine used by participants in the month prior to treatment (46% and 41% respectively). Only 10% reported 'powder' as the main form used, and 2% reported that they mainly used another form of methamphetamine (e.g., dexamphetamine, liquid methamphetamine).

Table 2. Methamphetamine use and drug use in the sample at baseline

	N = 100
Drug use history (median age in years)	
First intoxication	13
First methamphetamine use	17
First injection	18
First methamphetamine injection[a]	19
Onset of methamphetamine Dependence	20
Duration of methamphetamine use (median years)	10
Ever injected methamphetamine (%)	84
DSM-IV methamphetamine Dependence in the past year (%)	100
Methamphetamine use in the past month (median)	
OTI score	2
SDS score	10
Days used	16
Main route of methamphetamine administration in the past month (%)	
Inject	69
Smoke	18
Snort	1
Swallow	10
Main methamphetamine form used in the past month (%)	
Powder methamphetamine	10
Base methamphetamine	42
Crystalline methamphetamine	46
Other	2

[a]Among those who had ever injected methamphetamine (n = 84)

Polydrug use

Polydrug use was common among the sample, with participants having used a median of ten drug types (range 5 to 12 types) in their lifetime, and a median of five drug types (range 2 to 9 types) in the month before treatment (including methamphetamine) (Table 3). Cannabis use in the month before treatment was particularly prevalent (81%). Participants who used cannabis during that time smoked the drug on a median of 21 days (range 1 to 28 days). Alcohol use was also common, with 77% of treatment entrants drinking in the month before treatment, on a median of 12 days (range 1 to 28 days). Heroin use was less common among this sample: only 11% reported using heroin in the month before treatment, and they had used on a median of four days during this time (range 1 to 28).

Table 3. Polydrug use in the sample at baseline

Drug type	Lifetime (%)	Past year (%)	Past month (%)	Days used in past month[a] (median)
Methamphetamine	100	100	98	16 (1-28)
Tobacco	100	95	93	28 (28-28)
Alcohol	100	94	77	12 (1-28)
Cannabis	100	92	81	21 (1-28)
Ecstasy	91	76	47	2 (1-28)
Benzodiazepines	83	57	34	14 (1-28)
Cocaine	81	38	15	2 (1-16)
Other hallucinogens	76	24	10	3 (1-7)
Antidepressants	71	38	25	28 (1-28)
Other opiates	56	31	17	4 (1-28)
Heroin	56	23	11	4 (1-28)
Inhalants	46	20	7	1 (1 -12)

[a] Among participants who had used the drug in the past month

3.1.4 Comorbid psychiatric disorders

Major Depression

Prevalence: the past year prevalence of Major Depression among this sample was 44% (Table 4). For those who met DSM-IV criteria for Major Depression, its onset occurred at a median age of 18 years (range 2 to 44 years), and the longest episode of depression in the past year lasted a median 27 weeks (range 2 to 52 weeks). A further 45% reported Substance-Induced Depression. Suicidal ideation was common among participants: one-third (n = 33) of the sample reported having made a suicide plan in the past year, and one-fifth (n = 20) had attempted suicide during that time.

Help seeking for Major Depression: almost two-thirds (64%, n = 28) of participants with Major Depression received professional help for their depression in the past year; however, 89% (n = 25) of those who did thought that they had not received as much help as they needed. The main sources of help were general practitioners (50%, n = 14), followed by drug treatment workers and private/independent psychiatrists respectively (11%, n = 3). Of those who did not receive help for their depression in the past year, 88% (n = 14) thought that they required help.

Social Phobia

Prevalence: almost one-third (31%) of participants met the DSM-IV criteria for Social Phobia in the past 12 months. Onset of Social Phobia occurred at a median age of 17 years (range 4 to 34 years). A further 22% of the sample had Substance-Induced Social Phobia in the past year (Table 4).

Help seeking: over three-quarters (77%, n = 24) of participants with a Social Phobia diagnosis did not receive professional help for this disorder in the past 12 months. For the small proportion who did report receiving help in the past year (23%, n = 7), all reported that they thought that they did not receive as much help as they needed. The main sources of help for these participants were general practitioners (57%, n = 4) and drug treatment workers (43%, n = 3). For participants who reported receiving no help for their Social Phobia in the past year, two-thirds (67%, n = 16) thought that they needed help.

Panic Disorder with or without Agoraphobia

Prevalence: the prevalence of Panic Disorder (with or without Agoraphobia) among the sample was 31% in the past year (Table 4). For those participants with a DSM-IV diagnosis of Panic Disorder (n = 31), the median age of onset was 18 years (range 4 to 40 years). Fifty-eight per cent (n = 18) of participants with a Panic Disorder diagnosis also had symptoms of Agoraphobia. A further 10% had Substance-Induced Panic Disorder in the past year.

Help seeking: almost one-third (32%, n = 10) of participants with Panic Disorder had received professional help for their panic attacks in the past 12 months; however, only 20% (n = 2) thought that they had received as much help as they needed. The main sources of help were general practitioners (70%, n = 7) and private psychiatrists (20%, n = 2). Of those who reported receiving no professional help in the past 12 months, two-thirds (67%, n = 14) reported that they thought that they needed help for Panic Disorder during that time.

3.1.5 Psychosis and hostility

Lifetime psychosis

The lifetime prevalence of psychosis among this sample of methamphetamine treatment entrants was very high (83%) (Table 4). All participants who reported having been diagnosed with a chronic psychotic disorder (i.e., Schizophrenia, Bipolar Disorder, or Schizoaffective Disorder) qualified for a lifetime episode of psychosis. Among participants who had no known history of a chronic psychotic disorder, 78% had experienced a psychotic episode at some time in their life.

Psychotic symptoms and hostility in the month before treatment

Nearly half (47%) of participants had experienced a clinically significant symptom of suspiciousness, unusual thought content and/or hallucinations in the month prior to entering treatment: 29% of participants reported suspiciousness; 27% experienced unusual thought content; and 23% reported hallucinations (Table 4). Most clinically

significant symptoms were in the moderate range (i.e., BPRS scores of 4–5), with only 11% of participants experiencing severe symptoms (i.e., BPRS scores of 6–7) that would warrant hospitalisation.

Hostility was also measured in the month before treatment using the BPRS. Three-quarters of participants reported clinically significant hostility during that time (Table 4). Almost half of these participants (49%), or 37% of the entire sample, reported severe hostility (i.e., BPRS scores of 6–7), which ranged from assaults where no harm was likely (e.g., slapped or pushed someone) to actual harm to people or property.

Table 4. Psychiatric comorbidity in the sample at baseline.

Axis I Disorders	N = 100
Major Depression in the past year (%)	
Met DSM-IV Criteria	44
Substance-Induced Depression	45
No or sub-clinical symptoms	11
Social Phobia in the past year (%)	
Met DSM-IV Criteria	31
Substance-Induced Social Phobia	22
No or sub-clinical symptoms	47
Panic Disorder in the past year[a] (%)	
Met DSM-IV Criteria	31
Substance-Induced Panic Disorder	10
No or sub-clinical symptoms	59
Lifetime episode of psychosis [b] (%)	83
Past month symptoms of psychosis and hostility [c] (%)	
Suspiciousness	29
Unusual thought content	27
Hallucinations	23
Hostility	75

Note: The category 'No or sub-clinical symptoms' includes symptoms due to physical illness or injury.

[a] With or without Agoraphobia

[b] Screened positive on Jablensky's Psychosis Screen

[c] BPRS score of 4+

3.1.6 Other harms

Crime

Over two-thirds (68%) of the sample reported criminal involvement (i.e., property crime, dealing, fraud and/or violent crime) in the month before treatment (Table 5). Dealing was the most prevalent crime among participants in the month before treatment, with over half (52%) reporting selling drugs during this period. Over a third (36%) of the sample was involved in a property crime in the month before treatment. Fraud was less common (23%) and only a small proportion (9%) reported committing a violent crime. Half (51%) of participants reported an illegal income in the fortnight before treatment; 28% reported receiving more than $1200 from illegal activity during that time.

Injecting risk behaviour

Just over three-quarters (76%) of the sample reported injection of any drug in the month prior to commencing drug treatment. Equal numbers of participants reported either loaning or borrowing (18%, n = 14) a used needle in the past month (Table 5). Participants who borrowed a used needle during that time typically reported that only one person had used it before them (median 1, range 1 to 3 people). In the month prior to treatment, participants (n = 76) most commonly sourced sterile injecting equipment from pharmacies (74%, n = 56), Needle and Syringe Programs (63%, n = 48) and friends (32%, n = 24).

Sexual risk behaviour

Seventy per cent of participants were sexually active in the month before treatment and 23% of the sample had been sexually involved with more than one partner during that time. In that month, 10% of the sample had unprotected sex with more than one partner and 23% reported unprotected sex with casual partners (Table 5). Six per cent of the sample had been paid for sex in the month prior to treatment, with all but one (n = 5) reporting the use of condoms every time.

General health and wellbeing

Most participants (88%) had impaired mental health on the SF-12 in the month prior to entering treatment. Impaired physical health was not as prominent among the sample during that time (14%) (Table 5).

Psychological distress

Almost two-thirds (63%) of participants reported high levels of psychological distress on the K10 in the month before treatment. Moderate levels of psychological distress were reported by over one-third (35%) of the sample in that month, with only 2% reporting low levels or no psychological distress.

Table 5. Other harms in the sample at baseline

Other harms in the past month	**N = 100**
Crime (%)	
Property	36
Dealing	52
Fraud	23
Violent	9
Any crime	68
Sexual risk behaviour (%)	
Sexually active	70
Sex with more than one partner	23
Unprotected sex with more than one partner	10
Injection-related risk-taking behaviour (%)	
Loaned a used needle	18
Borrowed a used needle	18
SF-12 mental and physical health[a] (%)	
Impaired mental health	88
Impaired physical health	14
K10 psychological distress[b] (%)	
Low/nil	2
Moderate	35
High	63

[a] Score below 40 (i.e., more than one standard deviation below the normative mean).
[b] Low/nil = 0–15; Moderate = 16–29; High = 30–50. Moderate and high scores indicate a need for further assessment and possible intervention.

3.1.7 Summary

At baseline, participants in the cohort were typically unemployed, young adult males, who had completed ten years of schooling and who may have a technical or trade qualification. They lived in share accommodation, with their parents or with their partner before entering treatment, usually in privately rented accommodation, or at their parent's homes. A small proportion had dependent children. Over two-thirds had an arrest history and around one-quarter had a history of imprisonment. Most reported having been previously diagnosed with a mental health problem.

Participants in this study had a long history of methamphetamine and polydrug use. They first became intoxicated (with any drug or alcohol) at a median of 13 years of age, began using methamphetamine at a median of 17 years of age, and the median onset of methamphetamine dependence was 20 years of age. They had used the drug for approximately ten years when recruited into the study. Prior to treatment entry, all were dependent on methamphetamine, and they typically injected base or crystalline methamphetamine twice per day, and had used on a median of 16 days in the month before treatment. Polydrug use was common, with particularly high levels of cannabis and alcohol use noted.

The prevalence of comorbid psychiatric disorders was very high. The majority of participants had been clinically depressed in the past year, with 44% meeting criteria for Major Depression and a further 45% having similar levels of depression due to substance use. Suicidal ideation was common and one-fifth of the sample had attempted suicide in the past year. Around one-third of participants met criteria for Social Phobia or Panic Disorder (with or without Agoraphobia). Most participants (83%) had experienced an episode of psychosis in their lifetime and nearly half had experienced a clinically significant symptom of psychosis in the month before treatment. Three-quarters reported clinically significant levels of hostility in the past month.

The majority of the sample was involved in criminal activity: over two-thirds reported committing any crime in the month before treatment (most commonly drug dealing and property crime). Half had received money from illegal activity in the past fortnight.

In terms of risk behaviour for HIV and other blood-borne viruses, three-quarters had injected in the past month and small proportions had either borrowed or loaned a used needle and syringe. Over two-thirds were sexually active in the month before treatment and nearly one-quarter had engaged in some unprotected casual sex.

4 THREE MONTH RESULTS

4.1.1 Status three months post-treatment entry

Eighty-one participants were located and reinterviewed three months post-treatment entry (median of 100 days to follow-up, range 86 to 266 days). Of those participants who were not located for the three month follow-up interview (n = 19), three could not be followed up due to incarceration or death, one declined participation, and 15 could not be located. Of those participants who were followed up at three months, over half (58%, n = 47) were enrolled in residential rehabilitation at the time of recruitment into the study, one quarter (26%, n = 21) were enrolled in a withdrawal management program (inpatient or outpatient withdrawal management), and 16% (n = 13) were enrolled in outpatient counselling.

Participants who were followed up at three months (n = 81) were compared to those who could not be contacted (n = 19) in terms of their demographics, pre-treatment drug use, and psychiatric comorbidity at baseline (Appendix II). Male participants were more likely to be lost to follow-up at three months than females (24% cf. 7%, p = 0.059) as were participants with a prison history (31% cf. 15%, p = 0.075). Participants living with siblings or other relatives were also more likely to be lost to follow-up at three months (50% cf. 15%, p = 0.004). None of those who were living with dependent children were lost to follow-up (0% cf. 22%, p = 0.042) (Appendix II, Table A1).

When we examined the level of loss to follow-up at three months by participants' drug use history at baseline, we found no disproportionate loss to follow-up by age of first intoxication, first methamphetamine use, onset age for methamphetamine Dependence, or duration of methamphetamine use. Those with higher OTI scores were more likely to be followed up (2 cf. 0.5, p = 0.042), and there was a slight difference in the number of drug types used in the past year (those lost to follow-up reported slightly lower numbers of drug types used, compared to those who were followed up). There were no differences in loss to follow-up at the three month interview by whether methamphetamine had ever been injected, or, more generally, by participants' main route of methamphetamine administration (Appendix II, Table A2).

Those lost to follow-up at three months were less likely to have Social Phobia (including Substance-Induced Social Phobia, p = 0.036), but they tended to be more likely to have past month symptoms of suspiciousness (p = 0.050) and unusual thought content (p = 0.099) (Appendix II, Table A3).

4.1.2 Treatment exposure

Just over one-quarter (27%) of participants followed up at three months reported that they were still in their baseline treatment episode. Participants who had left their baseline treatment (73%, n = 59) spent a median of 20 days (range 1 to 127 days) in treatment. Seventy per cent of those followed up did not complete treatment, with the most common reasons cited for leaving being 'involuntary' (24%), 'left without notice' (20%) and 'left against advice' (17%). One-third of participants (32%) cited 'other' reasons for

leaving the baseline treatment episode (e.g., dissatisfaction with program content, medical discharge, leaving with consent, other personal/family issues).

Almost two-thirds (64%) of participants followed up at three months reported that they had received medication as part of their baseline treatment episode, with antidepressants the most common psychoactive medication received (43%). Twenty-six per cent reported receiving antipsychotic medication, 14% reported receiving mood stabilisers (e.g., sodium valproate, lithium), and 15% reported receiving benzodiazepines.

4.1.3 Demographics

At the three month follow-up interview, participants tended to be less likely to be living alone, and less likely to be unemployed if they were no longer in drug treatment (Table 6). Participants were also more likely to be living with non-related adults if they were still in treatment, which is probably because they were residing in residential rehabilitation facilities at that time (Table 6).

4.1.4 Drug use

Methamphetamine use

There were significant reductions in methamphetamine use at the three month follow-up interview. Past month abstinence was 61% (cf. 2% at baseline, $p < 0.001$), while methamphetamine Dependence fell from 100% at baseline to 26% in the month before the three month follow-up interview ($p < 0.001$). A further 11% of participants still met DSM-IV criteria for methamphetamine Abuse at three month follow-up. The Severity of Dependence Scale score fell from a median of 10 (possible range 0–15) to a median of two ($p < 0.001$). Days of methamphetamine use in the past month fell from a median of 16 days at baseline to a median of zero days at follow-up ($p < 0.001$), and the average use occasions per day (OTI score) fell from a median of two to zero ($p < 0.001$) (Table 7).

For those participants who were still using methamphetamine at three month follow-up (40%, $n = 32$), their frequency of use declined. In the month prior to three month follow-up, these participants reported using the drug on a median of once per day (range .07 to 5 use occasions per day), compared to a median of twice per day in the month prior to the baseline interview ($p < 0.001$). Days of methamphetamine use in the past month also significantly decreased at three months, with participants reporting using the drug on a median of five days during that time (range 1 to 28 days) compared to a median of 16 days of use in the month before entering treatment ($p < 0.001$).

Reductions in methamphetamine use were also seen across the entire period between treatment entry and follow-up (Table 7). Frequency of methamphetamine use since the baseline interview was significantly lower than in the year prior to entering treatment (Table 7). Fourteen per cent ($n = 11$) reported using methamphetamine at least three to four times per week during this time, compared to 80% in the year before treatment entry ($p < 0.001$); only 6% ($n = 5$) reported using the drug on five or more days per week since entering treatment, compared to 43% prior to baseline ($p < 0.001$). Forty-four per

cent of participants (n = 36) reported that they had remained abstinent in the three months since the baseline interview.

Polydrug use

Polydrug use rates declined significantly at the three month follow-up interview, with participants reporting having used a median of three drug types (range 0 to 8) in the past month, compared to five drug types (range 2 to 9 types) in the month before treatment ($p < 0.001$) (Table 8). Polydrug use in this context also refers to the use of methamphetamine in the past month.

The proportion of participants (n = 34) reporting past month use of cannabis almost halved at three month follow-up compared to baseline (42% cf. 81%, $p < 0.001$). Although the median days of cannabis use across the whole sample fell (0 cf. 14 days at baseline, $p < 0.001$), among those who were using cannabis at three month follow-up, their frequency of use had remained stable (median of 20 days cf. 18 days at baseline, n.s.[1]).

Past month alcohol use also decreased among the sample at three month follow-up (58% cf. 77%, $p = 0.015$) as did the median days of alcohol consumed during that time (1 cf. 8 days, $p < 0.001$). However, this reduction in alcohol consumption only occurred for participants who were still in treatment in the month prior to three month follow-up (Table 8). It is noteworthy that participants who continued to drink alcohol at follow-up did not reduce their days of alcohol consumption compared to pre-treatment (7 days vs. 12 days at baseline, n.s.).

Heroin use remained uncommon among the sample at three month follow-up, with only 4% (n = 3) reporting use of the drug in the month before follow-up (cf. 11% at baseline, n.s.). This group reported use of heroin on a median of seven days (range 2 to 11 days) in the past month, compared to a median of four days at baseline (n.s.).

[1]Non-significant

Table 6. Demographic characteristics at three month follow-up

				In treatment at 3 month follow-up interview			
	Baseline (n = 81)	3 Month (n = 81)	p value	No (n = 48)	p value	Yes (n = 33)	p value
Unemployed (%)	85	65	<0.001	50	0.002	88	n.s.
Net income in the past fortnight (median AU$)	480	500	n.s.	500	n.s.	500	n.s.
Living arrangements[a] (%)							
Alone	19	4	0.004	6	0.065	0	0.063
Partner (with or without children)	26	19	n.s.	23	n.s.	12	n.s.
Parents	22	22	n.s.	27	n.s.	15	n.s.
Non-related adults	35	56	0.005	42	n.s.	76	0.013
Siblings	7	9	n.s.	13	n.s.	3	n.s.
Housing (%)			0.013		n.s.		<0.001
Public	1	0		0		0	
Privately rented	49	32		48		9	
Privately owned	10	10		10		9	
Parent's home	23	20		25		12	
Boarding house	4	5		6		3	
Drug treatment residence	0	30		6		64	
No fixed address	11	3		2		3	
Other relative's home	1	1		2		0	

Note: Non-significant differences (p>0.10) are denoted by n.s. Statistical tests are based on matched pair-wise comparisons with participants' baseline measures. Living arrangements and housing pertain to the month prior to the interview.

[a]Participants could endorse more than one category

Table 7. Methamphetamine use at three month follow-up

				In treatment at 3 month follow-up interview			
	Baseline (n = 81)	3 Month (n = 81)	p value	No (n = 48)	p value	Yes (n = 33)	p value
Methamphetamine use in the past month							
OTI score (median)	2.0	0.0	< 0.001	0.1	< 0.001	0.0	< 0.001
SDS score (median)	10	2	< 0.001	3	< 0.001	1	< 0.001
Days used (median)	16	0	< 0.001	0	< 0.001	0	< 0.001
Abstinence[a] (%)	2	61	< 0.001	46	< 0.001	82	< 0.001
DSM-IV Abuse (%)	100	36	< 0.001	49	< 0.001	23	< 0.001
DSM-IV Dependence (%)	100	26	< 0.001	37	< 0.001	15	< 0.001
Methamphetamine use frequency[b](%)			< 0.001		0.021		0.025
No use	0	44		29		67	
Less than weekly use	5	25		31		15	
Weekly use	1	12		17		6	
Twice weekly use	14	5		6		3	
Three to four times weekly use	33	7		8		6	
Five or more times weekly	47	6		8		3	

Note: Statistical tests are based on matched pair-wise comparisons with participants' baseline measures.

[a]Abstinence from methamphetamine in the month prior to the baseline and three month interview.

[b]Methamphetamine use frequency in the past year at baseline, and in the period between the baseline interview and three month follow-up.

Table 8. Other drug use at three month follow-up

				In treatment at 3 month follow-up interview			
	Baseline (n = 81)	3 Month (n = 81)	p value	No (n = 48)	p value	Yes (n = 33)	p value
Other drugs used in the past month (%)							
Tobacco	94	89	n.s.	88	n.s.	91	n.s.
Cannabis	84	42	< 0.001	52	< 0.001	27	< 0.001
Alcohol	77	58	0.015	71	n.s.	39	0.013
Ecstasy	48	16	< 0.001	23	0.003	6	< 0.001
Benzodiazepines	38	24	0.038	27	n.s.	18	n.s.
Antidepressants	26	36	0.096	27	n.s.	46	n.s.
Other opiates	20	9	n.s.	8	0.065	9	n.s.
Cocaine	16	6	0.039	8	n.s.	3	n.s.
Hallucinogens	12	4	0.092	4	n.s.	3	n.s.
Heroin	10	4	n.s.	4	n.s.	3	n.s.
Inhalants	7	0	0.031	0	0.063	0	n.s.

Note: Non-significant differences (p>0.10) are denoted by n.s. Statistical tests are based on matched pair-wise comparisons with participants' baseline measures.

4.1.5 Psychotic symptoms and hostility

There was a noteworthy decrease in the proportion of participants who had experienced any clinically significant symptoms of suspiciousness, unusual thought content and/or hallucinations at the three month follow-up interview (23% cf. 46%, $p = 0.004$). There were corresponding drops in the severity of suspiciousness, unusual thought content and hallucinations. Drops in the prevalence of clinically significant symptoms on specific BPRS items failed to reach statistical significance (Table 9). Specifically, at three months 17% of participants reported experiencing past month clinically significant suspiciousness, compared to 25% at baseline (n.s.); 14% reported clinically significant unusual thoughts, compared to 23% at baseline (n.s.); and 12% reported hallucinations (cf. 22% at baseline, $p = 0.096$).

A decrease in clinically significant hostility was found at three months (40% cf. 74%, $p < 0.001$). Of clinical importance, there was a large reduction in the prevalence of severe hostility (i.e., assault, damage to property) in the month before the three month follow-up interview (10% cf. 37%, $p < 0.001$).

Table 9. Psychotic symptoms and hostility at three month follow-up

				In treatment at 3 month follow-up interview			
	Baseline (n = 81)	3 Month (n = 81)	p value	No (n = 48)	p value	Yes (n = 33)	p value
Symptoms of psychosis in the past month (%)							
Suspiciousness	25	17	n.s.	10	0.065	27	n.s.
Unusual thought content	23	14	n.s.	13	n.s.	15	n.s.
Hallucinations	22	12	0.096	10	n.s.	15	n.s.
Any psychotic symptom[a]	46	23	0.004	23	0.049	30	0.065
Hostility in the past month (%)	74	40	< 0.001	42	0.001	36	0.001
BPRS scores in the past month (median)							
Suspiciousness	3	2	< 0.001	2	< 0.001	2	0.059
Unusual thought content	2	1	< 0.001	1	< 0.001	1	n.s.
Hallucinations	2	1	< 0.001	1	0.001	1	n.s.
Hostility	5	3	< 0.001	3	< 0.001	3	< 0.001

Note: Non-significant differences (p>0.10) are denoted by n.s. Statistical tests are based on matched pair-wise comparisons with participants' baseline measures. Symptoms were defined as a score of 4+ on the BPRS.

[a]BPRS score of 4+ on items of either suspiciousness, unusual thought content or hallucinations.

4.1.6 Other harms

Crime

There was a significant reduction in criminal involvement at three month follow-up (Table 10). Just over one-third (37%) of the sample reported being involved in any crime (i.e., property, dealing, fraud and/or violent crime) in the past month compared to 68% at baseline ($p < 0.001$). The proportion of participants reporting property crime, dealing or fraud decreased relative to baseline, but there was no significant reduction in the proportion reporting violent crime (Table 10). One-fifth of participants reported receiving an illegal income in the past fortnight (cf. 51% at baseline, $p < 0.001$).

Injecting risk behaviour

Thirty-one per cent of participants had injected a drug in the month prior to the three month follow-up interview, which was a significant decrease compared to baseline (31% cf. 76%, $p < 0.000$). The proportion of participants who reported borrowing a used needle also decreased at three months (Table 10).

Sexual risk behaviour

Participants reported lower levels of sexual risk behaviour at three month follow-up if they were in drug treatment (Table 10). Participants who were still in treatment were less likely to be sexually active, to have had sex with more than one partner or to have had sex with a casual partner in the past month compared to baseline. No significant differences in sexual risk behaviour at three months were noted among participants who had left treatment at the three month follow-up compared to baseline (Table 10).

General health and wellbeing

Self-reported impairment in mental health during the past month was significantly less common at the three month follow-up than at baseline (49% cf. 88%, $p < 0.001$). Past month levels of impaired physical health were low and the same as at baseline (14%, n.s.) (Table 10).

Psychological distress

Self-reported levels of psychological distress also declined considerably among the sample at three month follow-up: the proportion of participants reporting high levels of psychological distress in the past month decreased significantly compared to baseline (41% cf. 63%, $p < 0.001$). Consequently, there were increases in the proportions reporting moderate psychological distress (44% cf. 35%, $p < 0.001$) and nil or low psychological distress in the past month at three month follow-up (15% cf. 2%, $p < 0.001$) (Table 10).

Table 10. Other harms at three month follow-up

Harms in the past month	Baseline (n = 81)	3 Month (n = 81)	p value	In treatment at 3 month follow-up interview: No (n = 48)	p value	Yes (n = 33)	p value
Crime (%)							
Property	36	15	< 0.001	13	n.s.	18	0.003
Dealing	53	22	< 0.001	31	0.013	9	0.001
Fraud	25	10	0.017	10	0.065	6	n.s.
Violent	11	5	n.s.	4	n.s.	6	n.s.
Any crime	69	37	< 0.001	44	0.008	27	0.001
Sexual risk behaviour (%)							
Sexually active	73	58	0.017	67	n.s.	46	0.008
Sex with more than one partner[a]	22	15	n.s.	21	n.s.	6	0.022
Unprotected sex with >1 partner[a]	10	9	n.s.	13	n.s.	3	n.s.
Unprotected sex with casual partner	25	14	0.039	19	n.s.	6	0.008
Injection related risk-taking behaviour[a](%)							
Any injection	74	31	< 0.001	42	< 0.001	15	< 0.001
Borrowed a used needle	14	1	0.002	0	0.031	3	n.s.
Loaned a used needle	12	5	n.s.	6	n.s.	3	0.063
SF-12 mental and physical health (%)							
Impaired mental health	89	49	< 0.001	54	0.001	42	0.001
Impaired physical health	15	14	n.s.	17	n.s.	9	n.s.
K10 psychological distress (%)			< 0.001		0.009		0.002
Low/nil	1	19		12		21	
Moderate	36	54		42		49	
High	63	27		46		30	

Note: Non-significant differences (p>0.10) are denoted by n.s. Statistical tests are based on matched pair-wise comparisons with participants' baseline measures. All measures pertain to the past month. [a]Refers to risk behaviour in the entire sample.

4.1.7 Lifetime diagnosis of Schizophrenia

Of participants followed-up at three months, 5% met DSM-IV criteria for a lifetime diagnosis of Schizophrenia and 20% had Substance-Induced Schizophrenia. All of these participants had Schizophrenia or Substance-Induced Schizophrenia in the past year. The median age of onset for Schizophrenia was 12 years (range 8 to 21 years), while the median onset of Substance-Induced Schizophrenia was 20 years (range 5 to 37 years).

4.1.8 Childhood diagnosis of Conduct Disorder

Most participants (85%) met the criteria for a childhood diagnosis of Conduct Disorder. The diagnosis of Conduct Disorder incorporates the measurement of four related traits: aggression, destructiveness, deceit and deviance. Within this sample, deceitfulness and aggression were endorsed by the majority of participants with Conduct Disorder (88% and 79% respectively), while deviance and destructiveness were comparatively less common (58% and 43% respectively).

4.1.9 Summary

At three month follow-up, the proportion of participants who were currently unemployed decreased. Participants were less likely to live alone, and most commonly resided with non-related adults in privately rented houses or flats, or drug treatment facilities.

Significant reductions in methamphetamine use were noted at three months, irrespective of whether participants were in drug treatment at the time of interview. The proportions meeting past month CIDI criteria for methamphetamine Abuse and Dependence decreased significantly, as did the severity of methamphetamine dependence. Almost two-thirds of the sample was abstinent from methamphetamine in the past month and, among those still using, all measures of methamphetamine use declined.

Polydrug use also decreased significantly at three months, with a median of only three drug classes being used in the month before interview. There were significant decreases in the past month use of cannabis and ecstasy, but reductions in alcohol consumption were only apparent among participants in treatment.

Five per cent of the sample met DSM-IV criteria for a lifetime diagnosis of Schizophrenia at three months, with the median age of onset occurring in early adolescence. A further fifth had Substance-Induced Schizophrenia. Most participants also met criteria for a retrospective lifetime diagnosis of childhood Conduct Disorder.

The prevalence of psychosis decreased significantly at three month follow-up. Only one-quarter of participants experienced any clinically significant psychotic symptom in the month before follow-up compared to almost half at baseline. The past month prevalence of hostility also decreased significantly among the sample. There was also an improvement in mental health functioning in the past month at three month follow-up,

with fewer participants reporting impaired mental health and high levels of psychological distress.

Participants' involvement in any crime decreased at three months and there were significant reductions in property crime, dealing and fraud in the month before interview. There was no significant reduction in the proportion of participants reporting violent crime.

The proportion of participants reporting injecting drug use in the past month significantly decreased at three month follow-up, and there was a corresponding decrease in needle sharing behaviour. Although the proportion of participants who were sexually active significantly decreased at three month follow-up, this was only true if participants were still in drug treatment. There was no significant reduction in risky sexual behaviour at three month follow-up among participants who had left treatment.

5 TWELVE MONTH RESULTS

5.1.1 Status twelve months post-treatment entry

Seventy-five participants were located and reinterviewed 12 months post-treatment entry. The median time to the 12 month follow-up interview was 379 days (range 356 to 560 days). Of those participants who were not followed-up for the 12 month follow-up interview (n = 25), one was deceased, 8 declined participation, and 16 could not be located. Of those participants who were followed-up at 12 months, 56% (n = 42) were enrolled in residential rehabilitation at the time of recruitment into the study, 28% (n = 21) were enrolled in a withdrawal management program (inpatient or outpatient withdrawal management), and 16% (n = 12) were enrolled in outpatient counselling.

The baseline characteristics of participants who were followed up at 12 months were compared to those who could not be contacted (see Appendix II). Compared to participants who were followed-up at 12 months, participants who were lost to follow-up had a lower income at baseline ($420 cf. $500, p = 0.083), were more likely to have an arrest history (p = 0.083), and tended to have a higher prevalence of suspiciousness (p = 0.056) and hostility (p = 0.083) in the month before treatment. They had also tended to have used fewer drug classes in the year prior to treatment entry (p = 0.091).

5.1.2 Treatment exposure

All participants had left their baseline treatment by the 12 month follow-up interview. Forty-seven per cent had started subsequent treatment episodes since finishing their baseline treatment episode (median 1, range 1 to 6 episodes). Fifteen per cent (n = 11) of the sample reported that they were in subsequent drug treatment at the time of the 12 month interview, and 17% had been in treatment at some point in the month prior to being interviewed at follow-up. The median days spent in treatment since baseline was 64 days (range 3 to 260 days).

5.1.3 Demographics

At 12 month follow-up, participants were significantly less likely to be unemployed compared to baseline (37% cf. 86%, $p < 0.001$). Accordingly, there was a significant increase in the proportion reporting current full-time employment (35% cf. 8% at baseline, $p < 0.001$). Participants' median fortnightly income rose significantly to $840 (range $265 to $7200) compared to the median fortnightly income reported at baseline ($455, range $0 to $7000, $p < 0.001$).

There were no significant differences noted between participants' living arrangements at 12 months and those at baseline, although at 12 months patterns of accommodation differed ($p < 0.001$). Of note, no participants reported 'no fixed address' in the month prior to 12 month follow-up (0% cf. 11%). Participants were more likely to report living in public housing (9% cf. 0%) or privately rented premises (49% cf. 29%) when compared to baseline.

Five per cent ($n = 4$) of participants reported that they had been imprisoned since their previous interview. These participants reported that they spent a median of 11 weeks (range 2 to 26 weeks) in prison on their last occasion of incarceration, and that a median of 21 weeks (range 2 to 40 weeks) had lapsed since their most recent release date.

5.1.4 Drug use

Methamphetamine use

The reductions in methamphetamine use observed at three month follow-up were maintained at 12 month follow-up (Table 11). The proportion of participants reporting methamphetamine abstinence in the past month was 61% (cf. 2% at baseline, $p < 0.001$), and the prevalence of Dependence on methamphetamine in the past month remained low (29% cf. 100% at baseline, $p < 0.001$). Past month methamphetamine SDS scores were significantly lower at 12 months when compared to baseline scores (median score 1 cf. 10, $p < 0.001$), as were participants' median days of methamphetamine use (0 cf. 16, $p < 0.001$) and median occasions of use per day (0 cf. 2, $p < 0.001$). For those participants who continued to use methamphetamine, their days of use in the month before follow-up had declined in comparison to baseline (4 days cf. 18 days at baseline, $p < 0.001$).

Significant reductions in methamphetamine use were also seen across the entire period between the 12 month follow-up and the previous interview at three months. Compared to participants' past year reports of methamphetamine use frequency at baseline, the proportion of the sample that reported heavy use of the drug in the time since their previous interview had decreased significantly ($p < 0.001$). For instance, 13% reported using methamphetamine at least three or more times per week since their last interview, compared to 80% at baseline. Consequently, an increase in the proportions of participants reporting infrequent use and abstinence was noted; 43% reported using methamphetamine less than weekly since their last interview, compared to 5% at baseline ($p < 0.001$), while one-quarter of participants reported that they had remained abstinent from the drug during the entire period since their last interview.

Polydrug use

At 12 month follow-up, polydrug use remained low in comparison with pre-treatment levels. Participants had used a median of five drug types (range 1 to 8 types) in the past year, compared seven drug types (range 2 to 11 types) in the year before they entered treatment ($p < 0.001$). A significant reduction was also observed in past month polydrug use (median 4 cf. 5 drug types at baseline, $p < 0.001$).

Significant reductions in polydrug use were specific to the use of cannabis and ecstasy, with non-significant trends toward reductions in the use of other illicit drugs (Table 12). Of note, the reductions in alcohol consumption observed at three months, which were specific to participants in treatment, were not maintained at 12 months, while tobacco use remained high at each follow-up interview.

The proportion of participants reporting past month use of cannabis decreased significantly at 12 months compared to baseline reports (52% cf. 81%, $p < 0.001$). Among participants who were smoking cannabis at 12 month follow-up, frequency of use was lower than among cannabis smokers at baseline (14 days vs. 21 days, $p < 0.001$).

Patterns of past month alcohol use remained stable among the sample at 12 months when compared to baseline reports (73% cf. 77%, n.s.). Among participants who drank in the month before 12 month follow-up ($n = 55$), alcohol was consumed on a median of eight days (range 1 to 28 days) in the past month compared to 12 days (range 1 to 28 days) among drinkers at baseline (n.s.).

Heroin use remained stable at 12 months in comparison with pre-treatment levels (11% past month use). Among those who had used heroin in the past month at 12 month follow-up, they had used the drug on a median of 9 days (range 1 to 21 days) during this time.

Table 11. Methamphetamine use at twelve month follow-up

	Baseline (n = 75)	12 month follow-up (n = 75)	p value
Methamphetamine use in the past month			
OTI score (median)	1.5	0.0	< 0.001
SDS score (median)	10	1	< 0.001
Days used (median)	16	0	< 0.001
Abstinence (%)	3	61	< 0.001
DSM-IV Dependence (%, past year)	100	29	< 0.001
Methamphetamine use frequency[a](%)			< 0.001
No use	0	25	
Less than weekly use	5	43	
Weekly use	3	9	
Twice weekly use	15	9	
Three to four times weekly use	32	9	
Five or more times weekly	45	4	

Note: Statistical tests are based on matched pair-wise comparisons with participants' baseline measures.

[a]Methamphetamine use frequency since the previous interview compared with the year prior to treatment entry.

Table 12. Other drug use at twelve month follow-up

	Baseline (n = 75)	12 month follow-up (n = 75)	p value
Polydrug use in the past month (%)			
Tobacco	93	88	n.s.
Cannabis	85	52	< 0.001
Alcohol	77	73	n.s.
Ecstasy	48	21	0.001
Benzodiazepines	35	25	n.s.
Antidepressants	28	29	n.s.
Other opiates	19	9	n.s.
Cocaine	16	5	0.077
Hallucinogens	13	4	0.065
Heroin	11	11	n.s.
Inhalants	8	1	0.063

Note: Non-significant differences ($p > 0.10$) are denoted by n.s. Statistical tests are based on matched pair-wise comparisons with participants' baseline measures.

5.1.5 Psychotic symptoms and hostility

There was a considerable decrease in the proportion of participants who had experienced clinically significant symptoms of suspiciousness, unusual thought content and/or hallucinations in the past month at 12 month follow-up compared to the month before commencing treatment (19% cf. 45%, p = 0.001). In particular, 11% (n = 8) of participants reported suspiciousness at 12 month follow-up compared to 24% at baseline (p = 0.052); 8% reported unusual thought content compared to 25% at baseline (p = 0.004), and 12% had experienced hallucinations (cf. 23% at baseline, n.s.). BPRS scores indicated a significant reduction in the severity of symptoms in all of the domains (Table 13). Only 2 participants (3%) reported severe symptoms of psychosis (i.e., that would warrant hospitalisation).

Past month hostility was also reassessed at 12 month follow-up: a significant decrease in clinically significant hostility was observed compared to baseline (41% cf. 71%, p < 0.001), as well as a significant reduction in the median BPRS score for hostility (3 cf. 5, p < 0.001). The prevalence of severe hostility was also significantly lower at 12 month follow-up than at baseline (17% cf. 35%, p = 0.015).

Table 13. Psychotic symptoms and hostility at twelve month follow-up

	Baseline (n = 75)	12 month follow-up (n = 75)	p value
Past month symptoms of psychosis (%)			
Suspiciousness	24	11	0.052
Unusual thought content	25	8	0.004
Hallucinations	23	12	n.s.
Any psychotic symptom	45	19	0.001
Past month hostility (%)	71	41	< 0.001
BPRS score in the past month (median)			
Suspiciousness	3	2	< 0.001
Unusual thought content	2	1	< 0.001
Hallucinations	2	1	< 0.001
Hostility	5	3	< 0.001

Note: Non-significant differences (p>0.10) are denoted by n.s. Statistical tests are based on matched pair-wise comparisons with participants' baseline measures.

5.1.6 Other harms

Crime

Reductions in crime found at three month follow-up were sustained at 12 month follow-up. Over one-third (39%, n = 29) of the sample reported being involved in any crime (i.e., property, dealing, fraud and/or violent crime) in the past month (39% cf. 68% at baseline, $p < 0.001$). The proportion of participants reporting past month involvement in dealing at 12 months more than halved compared to baseline (24% vs. 55%, $p < 0.001$). There was also a significant decrease in property crime and fraud at 12 months (Table 14). There was no significant difference in violent crime at 12 months compared to baseline (8% cf. 9%, n.s.).

Injecting risk behaviour

Thirty-six per cent of participants reported injecting drug use in the month before the 12 month follow-up interview, a significant decrease compared with participant reports at baseline (36% cf. 76%, $p < 0.001$). At 12 month follow-up, there was a significant reduction in the proportion of participants borrowing a used needle and syringe in the past month when compared to baseline (Table 14).

Sexual risk behaviour

There was no difference between the proportion of sexually active participants in the month prior to interview at 12 month follow-up and at baseline (72% cf. 70%, n.s.). Twenty-seven per cent (n = 20) had sex with more than one partner in the past month at 12 month follow-up (27% cf. 23%, n.s.). Of sexually active participants (n = 54), 22% had unprotected sex with more than one partner in the past month, compared with 10% at baseline (22% cf. 10%, n.s.). There was a reduction in the prevalence of unprotected sex with casual partners in the past month compared to baseline (12% cf. 25%, $p = 0.031$).

General health and wellbeing

There was a significant reduction in mental health impairment in the past month at 12 month follow-up compared to baseline (35% cf. 88%, $p < 0.001$). Past month physical health impairment remained low at 12 month follow-up, with no significant difference noted between the proportion of participants reporting physical impairment at 12 month follow-up and at baseline (8% cf. 14%, n.s.).

Psychological distress

Past month levels of self-reported psychological distress decreased significantly at 12 months. Notably, the proportion of participants reporting high levels of psychological distress in the month before 12 month follow-up decreased significantly compared to baseline (38% cf. 63%, $p < 0.001$), while there was a significant increase in the proportion reporting no or low levels of psychological distress in the past month at 12 month follow-up compared to baseline (23% cf. 2%, $p < 0.001$).

Table 14. Other harms at twelve month follow-up

	Baseline (n = 75)	12 month follow-up (n = 75)	p value
Crime (%)			
Property	35	16	0.011
Dealing	55	24	< 0.001
Fraud	25	11	0.007
Violent	8	8	n.s.
Any crime	68	39	< 0.001
Sexual risk behaviour (%)			
Sexually active	71	72	n.s.
Sex with more than one partner	23	27	n.s.
Unprotected sex with >1 partner	12	16	n.s.
Unprotected sex with casual partner	25	12	0.031
Injection related risk-taking behaviour (%)			
Any injection	76	36	< 0.001
Borrowed a used needle	15	5	0.039
Loaned a used needle	12	7	n.s.
SF-12 mental and physical health (%)			
Impaired mental health	88	35	< 0.001
Impaired physical health	17	8	n.s.
K10 psychological distress (%)			< 0.001
Low/nil	1	31	
Moderate	32	52	
High	67	17	

Note: Non-significant differences (p>0.10) are denoted by n.s. Statistical tests are based on matched pair-wise comparisons with participants' baseline measures.

5.1.7 Comorbid psychiatric disorders

Major Depression

The past year prevalence of Major Depression at 12 month follow-up was the same as at baseline (44%, Table 15); however, there was a significant reduction in the proportion of participants reporting Substance-Induced Depression (16% vs. 45%, $p < 0.001$). Consequently, the proportion of the sample who had either no symptoms, or only sub-clinical symptoms of depression, increased from 11% at baseline to 40% at 12 month follow-up. Suicidal ideation was lower at 12 months than at baseline: 16% reported that they had made a suicide plan in the past year (cf. 32% at baseline, $p < 0.029$) and 5% had attempted suicide in the past year (cf. 20% at baseline, $p < 0.013$).

Social Phobia

There was a significant reduction in the proportion of the sample with Social Phobia at 12 month follow-up, compared to baseline (9% cf. 31%, $p < 0.001$, Table 15). A significant decrease in the proportion of participants reporting Substance-Induced Social Phobia in the past year was also found at 12 month follow-up (5% cf. 22% at baseline, $p = 0.001$). Conversely, the proportion reporting no symptoms or sub-clinical symptoms of Social Phobia significantly increased at the 12 month follow-up interview compared to baseline (85% vs. 47%, $p < 0.001$).

Panic Disorder

At 12 months there was a non-significant decrease in the proportion of participants who met criteria for Panic Disorder (with or without Agoraphobia) compared to baseline (20% vs. 32%, Table 15). Five per cent met past year diagnostic criteria for Substance-Induced Panic Disorder at 12 months compared to 12% at baseline; however, this difference was also not significant. There was, however, an increase in the proportion of participants reporting no symptoms or sub-clinical symptoms of Panic Disorder at 12 month follow-up compared to baseline (75% cf. 56%, $p = 0.014$).

Table 15. Psychiatric comorbidity at twelve month follow-up

	Baseline (n = 75)	12 month follow-up (n = 75)	p value
Major Depression (%)			
Met DSM-IV criteria	45	44	n.s.
Substance-Induced Depression	47	16	< 0.001
No or sub-clinical symptoms	8	40	< 0.001
Social Phobia (%)			
Met DSM-IV criteria	33	9	< 0.001
Substance-Induced Social Phobia	27	5	< 0.001
No or sub-clinical symptoms	40	85	< 0.001
Panic Disorder[a] (%)			
Met DSM-IV criteria	32	20	n.s.
Substance-Induced Panic Disorder	12	5	n.s.
No or sub-clinical symptoms	56	75	0.014

Note: Non-significant differences ($p>0.10$) are denoted by n.s. Statistical tests are based on matched pair-wise comparisons with participants' baseline measures. The category 'No or sub-clinical symptoms' includes symptoms due to physical illness or injury.

[a]Panic Disorder with or without Agoraphobia

5.1.8 Lifetime diagnosis of a Manic Episode

Of participants followed-up at 12 months, 15% met DSM-IV diagnostic criteria for a Manic Episode at some time during their lifetime. All of these participants had had an episode of Mania in the past year. The median age of participant's first Manic Episode was 27 years (range 20 to 37 years). No participants met the criteria for a Substance-Induced episode of Mania.

While no formal diagnosis of Bipolar Disorder was made, it is worth noting that 45% of participants who had a Manic Episode also met DSM-IV criteria for Major Depression in the year prior to commencing treatment, while the remaining participants all had Substance-Induced Depression. Finally, 55% of participants who had a Manic Episode also met criteria for Schizophrenia (as assessed at 3 months), suggesting that their symptoms of Mania may have arisen in the context of Schizoaffective Disorder, which was not diagnosed in the current study.

5.1.9 Summary

Several significant demographic changes were observed among the sample at twelve months post-treatment entry. The proportion of participants who were currently unemployed decreased, with one-third in full-time employment at the time of interview. Participants' fortnightly income rose significantly. No differences were noted with regards to past month living arrangements; privately rented houses or flats were still the most common form of accommodation in the past month, followed by parent's homes.

There was a significant decrease across all methamphetamine use measures at 12 months compared to pre-treatment levels. The severity of methamphetamine dependence remained lower than it was at baseline and there was a significant decrease in the proportion who met DSM-IV criteria for methamphetamine Abuse and Dependence. Almost two-thirds were abstinent from the drug at 12 months, which was equivalent to the level of abstinence found at three month follow-up, and a significant increase in comparison to baseline.

Participants reported use of four drug types (including methamphetamine) in the month before the 12 month interview – a significant decrease from baseline. In comparison to baseline, there were significant decreases in the past month use of cannabis and ecstasy, although the proportions using these drugs were somewhat higher at 12 months compared to the proportions at three months. At 12 months, alcohol consumption was similar to baseline.

There were significant decreases in the past year prevalence of comorbid psychiatric disorders at 12 months, except for Major Depression, which remained stable across time. The prevalence of Substance-Induced Depression decreased significantly. At 12 months only one-tenth met criteria for a Social Phobia diagnosis and a fifth met criteria for Panic Disorder (with or without Agoraphobia). Consequently, there was a decrease in the number of participants who had these disorders in the past year.

The past month prevalence of psychotic symptoms decreased significantly at 12 months, with only a fifth experiencing any clinically significant symptoms of psychosis in the month before interview, compared to half at baseline. Past month hostility decreased significantly among the sample at 12 months also.

The proportion of participants reporting past month criminal involvement decreased significantly at 12 months in comparison to baseline, although it was equivalent to the proportion at three months. At 12 months, no difference was noted regarding the proportion involved in a violent crime in the past month compared to baseline.

The proportion of injectors decreased significantly at 12 months in comparison to baseline, and there were corresponding decreases in borrowing a used needle. At 12 month follow-up, the proportion of the sample engaging in unprotected sex with casual partners also decreased compared to baseline. However, no other differences in sexual risk behaviour were observed at 12 months compared to baseline.

At 12 months, participants' mental health functioning notably improved and the proportion reporting impaired mental health decreased significantly. Psychological distress levels also improved at 12 month follow-up, with one-fifth of the final sample reporting nil or low distress levels in the month before interview and the proportion reporting high levels of distress decreasing from almost two-thirds to just over one-third.

6 PREDICTORS OF TREATMENT OUTCOME

6.1.1 Demographics and drug use

Participants who were using methamphetamine frequently (16+ days) in the month before treatment were significantly less likely to be abstinent at 3 and 12 month follow-up (Table 16). Polydrug use, age, sex and prison history did not affect abstinence at follow-up; however, participants who were employed at baseline (including study and home duties) were less likely to be abstinent at follow-up (Table 16).

6.1.2 Treatment exposure

Abstinence at both 3 and 12 months was significantly more likely if participants spent more than six weeks in their baseline treatment episode (Table 17). The relationships between other measures of treatment exposure and abstinence were less clear: total duration of treatment exposure since entry to the study was significantly associated with abstinence at three month follow-up but this effect was attenuated at 12 months. Self-report of having completed the baseline treatment episode, or being retained in the baseline treatment episode (i.e., having spent more than the median time in treatment for that treatment modality) bore little relationship to abstinence at either time point (Table 17). Participants who attended residential rehabilitation were more likely to be abstinent at three months but, again, this effect was attenuated at 12 months (Table 17). Finally, there was a non-significant trend suggesting that participants who had started additional episodes of treatment after finishing their baseline treatment episode were less likely to achieve abstinence at 3 and 12 months (Table 17).

6.1.3 Psychiatric comorbidity

Participants with comorbid Panic Disorder (with or without Agoraphobia) or Social Phobia were more likely to be abstinent at three months, but this effect was not statistically significant at 12 months (Table 18). Major Depression did not have any impact on abstinence at follow-up (Table 18). Having symptoms of psychosis in the month prior to commencing treatment did not impact on abstinence at either follow-up point (Table 18). It was not possible to examine the impact of Schizophrenia or Mania on treatment outcomes because of the low prevalence of these disorders in the sample (5% and 15% respectively).

Table 16. Relationship between demographics and drug use at baseline, and abstinence at three and twelve month follow-up

	Abstinent at 3 months (%)	Abstinent at 12 months (%)
Age[a] (years)	p = 0.586	p = 0.486
<27	63	65
27+	58	57
Sex	p = 0.111	p = 0.714
Male	55	63
Female	73	58
Unemployment	p =0.006	p = 0.030
No	25	33
Yes	67	67
Prison history	p = 0.914	p = 0.952
No	60	61
Yes	61	63
Methamphetamine use[a] (days in past month)	p = 0.017	p = 0.041
< 16 days	75	73
16+ days	49	50
Polydrug use[a,b]	p = 0.952	p = 0.797
< 5 drug classes	60	59
5+ drug classes	61	62

Note: Group comparisons made at follow-up using a Pearson's Chi-square test. These comparisons do not control for baseline characteristics, time to follow-up, or treatment exposure during the past month.

[a] Based on a median split.

[b]Polydrug use reflects number of drug types used in the month before treatment

Table 17. Relationship between treatment exposure and abstinence at three and twelve month follow-up

	Abstinent at 3 months (%)	Abstinent at 12 months (%)
Modality of baseline treatment	p = 0.008	p = 0.107
Withdrawal management	29	52
Counselling	38	42
Residential rehabilitation	81	71
Duration of baseline treatment	p = 0.014	p = 0.006
< 6 weeks	48	48
6+ weeks	74	79
Retained in baseline treatment[a]	p = 0.318	p = 0.063
No	45	43
Yes	55	57
Completed baseline treatment	p = 0.413	p = 0.138
Completed or still in treatment	53	55
Left treatment	47	45
Total time in treatment since baseline	p =0.002	p = 0.079
< 6 weeks	39	48
6+ weeks	74	69
Number of treatment episodes started since baseline	p = 0.081	p = 0.066
One	70	71
More than one	50	50

Note: Group comparisons made at follow-up using a Pearson's Chi-square test. These comparisons do not control for baseline characteristics, time to follow-up, or treatment exposure during the past month.

[a]More than the median number of days in the baseline treatment episode: withdrawal management 7 + days; counselling 49+ days; residential rehabilitation 66+ days.

Table 18. Relationship between psychiatric comorbidity at baseline and abstinence at three and twelve month follow-up

	Abstinent at 3 months (%)	Abstinent at 12 months (%)
Major Depression	p = 0.919	p = 0.585
No	60	58
Yes	61	65
Social Phobia	p = 0.056	p = 0.867
No	54	62
Yes	76	60
Panic Disorder (with or without Agoraphobia)	p = 0.006	p = 0.887
No	51	61
Yes	83	63
Psychotic symptoms in month before treatment	p = 0.861	p = 0.585
No	61	59
Yes	59	65

6.1.4 Summary

Abstinence from methamphetamine use was more likely to be achieved if a person remained in a single treatment episode for a period of at least six weeks. Shorter exposure to treatment, and repeated treatment entries, were associated with comparatively lower abstinence rates. Residential rehabilitation appeared more likely to produce abstinence, although this may be due to the longer duration of residential treatment programs (e.g., typically three months or more), and that many residential rehabilitation participants were still in treatment at the three month follow-up interview. Indeed, the benefit of residential rehabilitation over other treatment modalities was reduced at 12 months once participants had left treatment.

The finding that heavier methamphetamine use was associated with worse treatment outcomes is consistent with previous research. This finding suggests that people with very heavy levels of methamphetamine use may require more intensive or different types of treatment approaches in order to improve their treatment outcomes. In this context, a stepped care approach has been recommended (Baker et al., 2004), whereby treatment entrants who do not respond to an initial treatment intervention are offered a more intensive treatment package. Adjunctive pharmacotherapy may also help to retain heavy methamphetamine users and improve treatment outcomes. However, its implementation would need to consider potential adverse interactions with prescription pharmaceuticals (e.g., antidepressants) and the potential for pharmacotherapy to exacerbate psychiatric symptoms.

The absence of any adverse impact of psychiatric disorders on treatment outcomes is encouraging, but the lack of any impact of Major Depression on treatment outcomes is inconsistent with some previous research (Baker et al., 2004). The lack of any relationship between Major Depression and treatment outcomes could be due to the high levels of clinical depression in the current sample. Specifically, most participants (89%) who did not meet criteria for Major Depression had Substance-Induced Depression, leaving only 7% of the entire sample without clinical levels of depression. Anxiety disorders were associated with higher levels of abstinence at three month follow-up, but not at 12 months post-treatment. This finding should be treated with caution because it could be an artefact of differential drop-out of participants with anxiety disorders at the three month follow-up (Appendix II).

The current findings suggest that different treatment approaches may be warranted for methamphetamine treatment entrants who are employed. This group had notably low levels of abstinence at follow-up in comparison with unemployed treatment entrants. Worse treatment outcomes among employed participants may be related to conflicting commitments with their employment (e.g., times that they can attend treatment, perceived performance benefits from stimulant use). This finding has important clinical implications and needs to be confirmed among the larger MATES sample, due to the small number of employed participants in the current study.

Finally, this analysis of predictors of treatment outcome did not control for a number of factors that would impact on treatment outcomes, including having been in treatment at follow-up, time to follow-up, and the bias caused by participants who dropped out of the study at follow-up. Modelling the influence of these factors was unsuccessful because of the small sample size. Therefore, the current findings about predictors of treatment outcomes need to be confirmed in a larger sample, and in a context where the influence of treatment exposure and differential drop-out can be adjusted for.

7 DISCUSSION

7.1.1 Summary of findings

Characteristics of methamphetamine treatment entrants

An aim of the current study was to determine the characteristics of methamphetamine users in Brisbane seeking treatment for dependence on the drug. The typical methamphetamine treatment entrant in this sample was a single young adult male with ten years of school education. Although half had completed a trade or technical qualification, only a few had completed a tertiary degree, and the levels of unemployment and income at baseline suggest that the majority face substantial social disadvantage. Patterns of accommodation and living arrangements at this time attest to this: participants mainly rented privately, or resided in their parent's homes, and few participants had children in their custody. Lifetime and past month levels of criminal involvement further illustrate this marginalisation, as does the number of participants that began treatment with prior histories of mental health problems – depression and anxiety in particular. While only a minority presented to treatment with impaired physical health, the overwhelming majority (88%) had mental health impairment and nearly all (98%) demonstrated moderate to severe levels of psychological distress.

The group had an extensive history of methamphetamine and polydrug use. Onset of methamphetamine use and injection typically occurred in mid to late adolescence, and methamphetamine had been used for approximately ten years prior to recruitment into the study. Given the frequency of methamphetamine use both in the past year and in the month before presenting to treatment, it is unsurprising that all participants met DSM-IV diagnostic criteria for Dependence on methamphetamine at baseline. Most injected base or crystal methamphetamine in the month prior to treatment, and severe levels of dependence were reported; only two people were abstinent during this time. Alcohol, tobacco and cannabis use was also common, as was, to a lesser extent, the use of benzodiazepines and ecstasy.

Taking into account participants' socio-demographic characteristics, the fact that the current study found a very high prevalence of comorbid mental health disorders among the group is perhaps to be expected. The overwhelming majority of this sample was clinically depressed in the year prior to commencing the baseline treatment episode (89%): comparable proportions met DSM-IV diagnostic criteria for Major Depression (44%) and Substance-Induced Depression (45%) respectively. One in five participants in the study had attempted suicide in the past year, which illustrates the severity of depression among this group irrespective of its etiological origins. In addition, substantial proportions also met DSM-IV diagnostic criteria for Social Phobia (31%) and Panic Disorder (31%). The average age of onset for these Disorders coincided with late adolescence and initiation to methamphetamine use and injection.

The prevalence of Schizophrenia and Childhood Conduct Disorder was examined at three months, and Mania was examined at 12 months. Only a small proportion met DSM-IV diagnostic criteria for a lifetime diagnosis of Schizophrenia, which may be an underestimate of the prevalence in this sample because several symptoms of schizophrenia (e.g., alogia, catatonia, affective withdrawal) were not assessed. Notwithstanding this, a fifth of treatment entrants met lifetime diagnostic criteria for a Substance-Induced Schizophrenia, which, according to previous research, may suggest a premorbid vulnerability for a prolonged psychosis among this group (Chen et al., 2005; Chen et al., 2003). Although only a minority of participants met criteria for chronic psychotic disorders (i.e., Schizophrenia and Mania), most participants had experienced at least one psychotic episode in their lifetime, and symptoms of psychosis were prevalent among the sample in the month before treatment. This high prevalence of psychotic symptoms is presumably due to methamphetamine-induced psychosis, which is a transient paranoid psychosis brought on by excessive use of the drug. Clinically significant hostility was also very high at baseline, but somewhat expected given participants' heavy use of methamphetamine, polydrug use and concurrent symptoms of psychosis (particularly suspiciousness) in that month (McKetin et al., 2006c). The high prevalence of hostility may also be related to the high prevalence of childhood Conduct Disorder found. With regards to Mania in the past twelve months, the proportion of those who met DSM-IV diagnostic criteria for a Manic Episode was higher than the general population (Andrews et al., 1999), and is therefore noteworthy.

Treatment outcomes

Despite participants' social disadvantage and comorbidity, treatment outcomes at three and twelve month follow-up were very positive. At both time points, methamphetamine use decreased significantly among the sample, as did the proportions that met DSM-IV criteria for Abuse and Dependence (19% and 29% respectively). Accordingly, past month abstinence rates significantly improved at three months and were sustained at twelve months (61%). Among participants who reported ongoing use of methamphetamine, frequency of use declined.

Participants' polydrug use also abated somewhat throughout the study duration – there were considerable reductions in the proportions reporting use of other drugs in the past month at both follow-up points. The proportion of past month cannabis and ecstasy users decreased significantly by the end of the study (by 29% and 26% respectively). Alcohol use only decreased during treatment – the proportion drinking in the month before the final interview was equivalent to baseline, suggesting that some participants may have returned to their pre-treatment patterns of alcohol consumption. Additionally, tobacco use did not change over time, which may be a reflection of the scope and primary goals of the treatment programs rather than program efficacy per se.

The overall reduction in comorbidity among the sample at twelve months was very encouraging. The proportion experiencing nil or subclinical symptoms of depression in the past year at twelve months significantly increased (40%), and there was a reduction in the

proportion meeting DSM-IV diagnostic criteria for Substance-Induced Major Depression (16%). Although treatment appeared to ameliorate symptoms of Substance-Induced Depression, at twelve months the prevalence of Major Depression was the same as it was at baseline (44%). But the reduction in suicidal ideation was heartening – only one in twenty had attempted suicide in the past year, compared to one in five in the past year at baseline. A diagnosis of depression at baseline did not appear to have any bearing on abstinence at three or twelve months.

Social Phobia significantly decreased in prevalence at twelve months. The majority of the sample experienced nil or sub-clinical Social Phobia in the past year (85%) and only a small proportion met DSM-IV criteria for a clinical diagnosis of this disorder post-baseline treatment (9%). Conversely, the decrease in the prevalence of Panic Disorder at twelve months was not significant (20% cf. 31%). It was noted, however, that there was a significant increase in the proportion that had no or sub-clinical symptoms of this disorder (75% cf. 52%). There was some evidence to suggest that these anxiety disorders were associated with higher abstinence rates at 3 month follow-up; however, this relationship was no longer evident at twelve months. This anomaly may be explained by a statistical lack of power, and the inability to control for differential drop-out of participants with anxiety disorders in the current sample (see Appendix II). This relationship will be clearer after analysis of the larger MATES sample is complete.

Treatment appeared to have a considerable effect on the prevalence of psychosis in the past month at both follow-ups, with the proportion of participants reporting any clinically significant psychotic symptom in the past month almost decreasing by half from baseline to twelve months. Psychotic symptoms in the month prior to commencing treatment did not appear to impede treatment outcomes at three or twelve months. The prevalence of hostility also decreased over time. Although the proportion with clinically significant hostility was still high at twelve months (41%), the median hostility score for the sample was reduced to sub-clinical levels by the end of the study.

Treatment also appeared to reduce other methamphetamine-related harms for this group. Participants' criminal involvement decreased significantly at both points in time, except for violent crime, which remained stable. Some changes in HIV risk-taking behaviour were noted, particularly the proportion of participants' engaging in unprotected casual sex, which decreased by half to 12% at twelve months compared to baseline. Treatment did not impact on other risky sexual behaviours. But, injecting drug use significantly decreased by twelve months, as did the number of participants borrowing used needles. Additionally, levels of mental health impairment also significantly improved over both time points, although noteworthy proportions (69%) still demonstrated moderate to severe levels of psychological distress twelve months post-treatment.

7.1.2 Methodological considerations

The current study did not have a non-treatment comparison group, which means that it is not possible to conclude that the people who entered treatment would not have reduced their drug use regardless of the treatment intervention. Given that most people who enter drug treatment have a high level of motivation to reduce their drug use, it is feasible that treatment acted as a catalyst to what may have been a natural maturation process in reducing methamphetamine use. In support of a role for treatment in facilitating methamphetamine abstinence, the current study found that longer treatment exposure was related to improved treatment outcomes, and that treatment modalities that involved longer treatment exposure (i.e., residential rehabilitation) produced more positive outcomes than those of shorter duration. Finally, the reductions in drug use observed following treatment are substantially greater than those seen in many clinical trials (Shoptaw et al., 2006; Baker et al., 2005, 2006). It seems reasonable to assume that people who participate in treatment trials have similar levels of motivation to reduce their drug use as those who enter drug treatment in the community. If this assumption is true, then it follows that client motivation alone is unlikely to account for the particularly high levels of abstinence (61%) seen following treatment in the current study.

One of the major limitations of the current study is that the sample size precluded a detailed analysis of treatment outcome predictors. Importantly, factors that might have confounded treatment outcomes, such as being retained in treatment at follow-up and differential attrition, could not be adjusted for. For this reason, findings about the impact of psychiatric comorbidity and other demographic factors on the outcome of treatment need to be replicated in the larger MATES cohort before any firm inferences can be drawn. Despite this limitation, the reductions in methamphetamine use were so large that it is unlikely that they could be entirely accounted for by differential attrition at follow-up. Even if all participants who were not followed-up did not respond to treatment, and those who were still in treatment at follow-up were excluded, around half of the sample would still have been abstinent at 12 month follow-up.

It is impossible to determine to what extent the current sample of methamphetamine users is representative of all methamphetamine treatment entrants in Brisbane, or Australia. However, participants were recruited from a large number of treatment agencies and various treatment modalities. Therefore, the study findings are not idiosyncratic to a specific treatment setting or modality, which is one of the advantages of a community-based treatment evaluation over a clinical trial. While community based studies suffer from the limitations of being unable to experimentally control treatment exposure, they tend to have higher external validity than controlled trials, and their findings apply directly to current practice and policy. Many clinical treatment trials for methamphetamine use exclude people who present with comorbid psychiatric diagnoses or severe psychotic symptoms. But methamphetamine users who enter community-based drug treatment services do present with comorbidity, and so it is important to understand whether they can be treated successfully. Indeed, the current findings show that not only do the majority of

methamphetamine users present to treatment with comorbid psychiatric problems, but that they still respond to drug treatment, showing reductions in their drug use, and in some cases, their psychiatric morbidity.

Many methamphetamine users attributed their psychiatric symptoms to drug use, and they were therefore classified as having a 'Substance-Induced' disorder. This phenomenon was particularly apparent for Major Depression, which is not surprising given that heavy methamphetamine use and consequent withdrawal from the drug results in a pseudo-depressive state (Bamford et al., 2008; McGregor et al., 2005). However, this subjective attribution of psychiatric symptoms to drug use raises an important issue around the measurement of psychiatric disorders among drug-using populations. The CIDI has been validated in general population samples (Janca et al., 1992), where the prevalence of heavy drug use is very low. Its validity has not been demonstrated within populations of dependent drug users, where participants' attribution of their symptoms to drug use is likely to be far more common, and which may lead to a misdiagnosis of psychiatric disorders. Therefore, the distinction made in the current study between drug-induced disorders and major psychiatric disorders (not due to drug use) needs to be considered cautiously.

The second important issue raised by the high prevalence of substance-induced psychiatric disorders in the current sample is whether there is any clinical relevance in distinguishing between people who meet diagnostic criteria for a psychiatric disorder and those that report the same symptom profile due to substance use. The rationale for such a distinction is that if symptoms are due to substance use, then treatment of drug use should alleviate symptoms of the psychiatric disorder – there will be no need to treat the psychiatric condition in its own right. Substance-Induced diagnoses also imply that symptoms have less clinical gravity, and dissipate with the cessation of substance use. The current data provide some support for this view, with reductions in the prevalence of substance-induced disorders post-treatment being observed more clearly and more consistently than reductions in the prevalence of disorders that were not due to substance use. However, the severity of substance-induced symptoms was equivalent to symptoms seen when the disorder was not attributable to substance use, suggesting that clinical management is still required regardless of symptom aetiology.

7.1.3 Implications

The high prevalence of comorbidity among this sample of methamphetamine treatment entrants, although consistent with previous research on methamphetamine users in the community (Darke et al., 2008; McKetin et al., 2006b; Hando et al., 1997; Hall et al., 1996), and other methamphetamine treatment samples (Christian et al., 2007; Dyer & Cruickshank, 2005) is concerning. This is particularly so with regards to the levels of clinical depression and the prevalence of suicidal ideation observed among the group in the year prior to commencing the baseline treatment episode, and psychological distress levels in the previous month at baseline. Comorbidity generally is associated with poorer treatment outcomes, a worse client prognosis, and an increasing likelihood of treatment drop-out (Glasner-

Edwards, 2008; McKay et al., 2002; Broome, 1999). Nevertheless, methamphetamine use outcomes improved significantly among the sample despite comorbidity at baseline, demonstrating that treatment for reducing methamphetamine use is effective and should be provided irrespective of comorbid mental health problems.

Although it did not impede abstinence at three or twelve months, the fact that comorbid depression did not improve for some participants over time clearly illustrates the necessity for treatment services to have a dual diagnosis component for the many drug users who present with these types of co-occurring disorders. While some studies have found better treatment retention and substance use outcomes among depressed clients, depression has also been associated with accelerated rates of substance use for those that relapse post-treatment (McKay et al., 2002; McKay, 2005). That the current study found no improvement in the prevalence of depression is consistent with previous research by Baker and colleagues (2005), which found residual depression among methamphetamine treatment entrants in trials of cognitive-behaviour therapy (CBT) after drug use reduced. Implementing a 'stepped care' approach has been recommended to address enduring depressive symptoms among methamphetamine users (Baker et al., 2005; Baker et al., 2004), whereby supplementary treatment is provided to those with comorbid depression when their depression and/or drug use does not respond to standard interventions and care. Providing extra support for clients with depression is important for retaining treatment outcomes in the long term and preventing relapse to drug use.

Given that methamphetamine dependence is associated with psychosis (McKetin et al., 2006b; Chen, 2003; Farrell et al., 2002; Hall et al., 1996) it was not surprising to find that most of the sample had a history of a lifetime psychotic episode and that almost one in two participants had experienced a clinically significant psychotic symptom in the month before treatment at baseline. Compared to the general population, the prevalence of chronic psychotic disorders (i.e., Schizophrenia and Mania) was high, but comparable to previous research examining psychosis among methamphetamine users (McKetin, 2006b). In contrast, the prevalence of psychotic symptoms outside the context of chronic psychotic disorders was far higher than found among methamphetamine users in the general community or among the general population. Specifically, the lifetime prevalence of psychosis among the general population is typically below 3% (Andrews et al., 2001; Degenhardt & Hall, 2001), while its prevalence among methamphetamine users in the community has been estimated at 13% (McKetin et al., 2006b). The current study found that 84% screened positive for a lifetime episode of psychosis, and half had clinically significant paranoia or hallucinations in the month before treatment.

Although these findings may seem alarming, the rate of psychosis and hostility among the group decreased significantly over time. While psychosis and hostility are not synonymous, neither were related to poorer treatment outcomes overall. Treatment in itself for methamphetamine use may in fact ameliorate symptoms of psychosis and hostility in dependent users, which is very positive. It is important that education both for users of

methamphetamine and drug treatment workers alike explicitly discusses the risks and early warning signs for drug-induced psychosis and hostility (e.g., persecutory ideation or suspiciousness, prior history of violence, a perceived threat), the management of these symptoms and their general transience. For more severe cases, clear referral pathways to appropriate psychiatric care are necessary.

That participants' social and demographic characteristics improved over the duration of the study is cause for optimism. At baseline, this sample of methamphetamine treatment entrants was not dissimilar demographically to sentinel populations of illicit drug users in south-east Queensland (Kinner et al., 2006; Kinner & Lloyd, 2005), particularly with regards to sex, schooling years, living arrangements and other socio-economic variables. On average, though, the group was younger than community samples of injecting drug users, which is perhaps reflected by the proportion still residing in their parent's homes throughout the study, the lower rate of lifetime imprisonment and the limited numbers reporting recent use of heroin. Nonetheless, the level of social disadvantage and marginalisation was comparable. Despite this, there was considerable improvement across several key socio-demographic variables among participants over time since baseline, and by twelve months post-treatment entry the group's median income had raised significantly, unemployment decreased, and notable proportions were re-engaged in employment and/or study. Treatment therefore seems to play a central role in reorienting methamphetamine users towards social and economic participation in the community, which in turn appears to facilitate better drug use outcomes for this group as well.

Finally, while the recent introduction of methamphetamine-specific drug treatment services is a worthwhile initiative, this sample responded very well to treatment modalities already established in the community. The current study was limited to methamphetamine users who were already accessing these services, but based on these results, existing approaches do appear to produce good outcomes for the population. Treatment modality and duration improved treatment outcomes, with longer duration of treatment and residential rehabilitation producing better outcomes for this particular group. This finding is consistent with community-based treatment evaluations in the United States, which also achieved high levels of abstinence following residential treatment (Hillhouse et al., 2007; Brecht et al., 2006). These findings suggest that current community approaches ought to be maintained. Further investigation into the particular aspects of individual treatment services that hinder or improve treatment outcome may also be warranted.

7.1.4 Conclusion

The current study found that methamphetamine treatment entrants respond very well to treatment that is currently being provided in the general community. Participants showed marked reductions in drug use, with the majority reporting abstinence from methamphetamine at both follow-up points. Importantly, there were no concurrent increases in polydrug use, indicating that methamphetamine use was not being replaced with other drug use. Current treatment practices were also associated with significant

improvements in indices of social integration and mental wellbeing, including reduced involvement in crime, reduced HIV risk behaviour and reduced psychological distress. Nonetheless, methamphetamine treatment entrants in the current sample had extraordinary levels of psychiatric comorbidity. Clinical levels of depression and psychotic symptoms were almost ubiquitous and over one-third suffered debilitating anxiety disorders. Although substance-induced psychiatric symptoms remitted following drug treatment, a large proportion of methamphetamine treatment entrants were still experiencing major psychiatric disorders, particularly Major Depression, after they had completed drug treatment. Taken together, these findings show that drug treatment does work for methamphetamine users, and that it can still work when methamphetamine users have comorbid psychiatric disorders, but that additional treatment is required to address their residual psychiatric comorbidity and to maximise longer-term treatment outcomes.

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9 APPENDIX I

9.1 DSM-IV definitions of Axis I Psychiatric Disorders

9.1.1 Major Depression

Major Depressive Episode

According to the Diagnostic and Statistical Manual Version IV (DSM-IV) (APA, 2000), the essential feature of a Major Depressive Episode is a period of at least two weeks throughout which the individual experiences either depressed mood or the loss of interest or pleasure in nearly all activities. Four additional symptoms drawn from a list of symptom clusters are also experienced for criteria to be met:

1. changes in appetite or weight, sleep, and psychomotor activity;
2. decreased energy;
3. feelings of worthlessness or guilt;
4. difficulty thinking, concentrating, or making decisions; or
5. recurrent thoughts of death or suicidal ideation, plans or attempts.

Symptoms must persist for most of the day, nearly every day, for at least one fortnight and clinically significant distress or impairment in social, occupational, or other important areas of functioning must accompany the episode. The Major Depressive Episode is not due to the direct physiological effects of a substance (i.e., alcohol and other drugs, medication or treatment side-effects, or exposure to toxins). Further, the episode is not due to the direct physiological consequences of a general medical condition.

Major Depressive Disorder

A Major Depressive Disorder is essentially a clinical course characterised by one or more Major Depressive Episodes. Again, episodes directly attributable to the physiological effects of a substance or general medical condition are discounted. However, a chronic general medical condition and/or substance dependence may contribute to the onset or exacerbation of Major Depressive Disorder.

The DSM-IV distinguishes a Substance-Induced Mood Disorder from a Major Depressive Episode and Major Depressive Disorder. In the case of a Substance-Induced Mood Disorder, the effects of a substance (i.e., alcohol and other drugs, a medication, or a toxin) are determined to be etiologically related to the mood disturbance, in that the depressed mood occurs only in the context of the physiological effects of a substance (APA 2000).

9.1.2 Social Phobia (Social Anxiety Disorder)

The DSM-IV describes the essential feature of Social Phobia as a marked and persistent fear of one or more social and/or performance situations in which the person is exposed to unfamiliar people or to possible scrutiny by others. Exposure to such situations consistently provokes anxiety in affected individuals that may include symptoms such as palpitations, tremors, sweating, gastrointestinal discomfort, diarrhoea, muscle tension, blushing and/or confusion. Adolescents and adults with this disorder recognise that their fear is excessive or unreasonable. Typically, the social or performance situation is avoided, although individuals may sometimes endure the situation with dread.

To meet Social Phobia diagnostic criteria, the avoidance, fear or anxious anticipation of encountering the social or performance situation interferes significantly with the individual's daily routine, occupational or academic functioning, or social life. The individual otherwise experiences marked distress about having the phobia. For example, according to the DSM-IV, while fears of being embarrassed in social situations are common, the degree of impairment or distress is usually insufficient to warrant diagnosis of Social Phobia. Diagnostic criteria excludes fear or avoidance that is directly due to the physiological effects of a substance (i.e., alcohol and other drugs, medication or treatment side-effects, or exposure to toxins), or to a general medical condition. Additionally, criteria exclude fear or avoidance that is better accounted for by another psychiatric disorder (APA, 2000).

9.1.3 Panic Disorder (with or without Agoraphobia)

The essential feature of Panic Disorder, as per the DSM-IV, is the presence of recurrent, unexpected Panic Attacks, which are followed by at least one month of persistent concern about having another Panic Attack, worry about the possible implications or consequences of the Panic Attacks, or a significant behavioural change related to the Panic Attacks. For diagnostic criteria to be met, the Panic Attacks are not due to the direct physiological effects of a substance (i.e., alcohol and other drugs, medication or treatment side-effects, or exposure to toxins), or to a general medical condition, and are not better accounted for by another psychiatric disorder. Individuals may also meet criteria for Panic Disorder with Agoraphobia, or Panic Disorder without Agoraphobia may be diagnosed.

At minimum, two unexpected Panic Attacks are required for diagnosis; however, most individuals have more. Panic Attacks may be situationally predisposed or situationally bound, although situationally bound attacks are less common. Individuals with Panic Disorder display characteristic concerns or attributions about the implications or consequences of the Panic Attacks. For example, some fear that the attacks indicate the presence of an undiagnosed life-threatening illness, while others fear that the attacks are an indication that they are 'going crazy', or losing control, or are emotionally weak. Those with recurrent attacks notably change their behaviour in response to the attacks. Concerns about a subsequent attack are often associated with the development of avoidant behaviour that may

meet criteria for Agoraphobia. Because individuals with Panic Disorder may self-medicate symptoms, comorbid Substance-Related Disorders are not uncommon.

Panic Disorder with Agoraphobia is characterised by the initial onset of unexpected Panic Attacks and the subsequent avoidance or endurance with dread of multiple situations thought to be probable triggers of the Panic Attacks. Such situations include being outside one's home alone, travelling in a bus, train or car, being in crowds or standing in line, and being in public places. If the individual has additional unexpected Panic Attacks in other situations, but no avoidance or endurance with dread develops, then the appropriate diagnosis is Panic Disorder without Agoraphobia (APA, 2000).

9.1.4 Schizophrenia

Criterion A: Characteristic Schizophrenia symptoms

Two (or more) of the following symptoms are each present for a significant portion of time during a one month period (or less if successfully treated) (APA, 2000):

1) **Delusions.** False beliefs that are strongly held in spite of invalidating evidence, especially as a symptom of mental illness. That is:

   - paranoid delusions, or delusions of persecution. For example, the person believes that people are "out to get" them, or may have thoughts that people are doing things to them when there is no external evidence that such things are occurring;
   - delusions of reference – When the person believes that things in the environment are directly related to them, even though they are not. For example, it may seem as if people are talking about the person or that special personal messages are being communicated to them through the television, radio, or other media;
   - somatic delusions. The person has false beliefs about their body. For example, the person may believe that they have a terrible physical illness or that something foreign is inside them or passing through their body;
   - delusions of grandeur. The person believes that they are very special, or have special powers or abilities that others lack. Examples of grandiose delusions include believing that one is god, or a nation's president, or a famous rock star.

2) **Hallucinations.** Hallucinations may occur in different forms. They can be:

   - visual – the person sees things that are not there, or that other people cannot see;
   - auditory – the person hears voices that other people cannot hear;
   - tactile – the person feels things that other people do not feel, or feels something touching their skin when nothing is present;

- olfactory – the person smells things that other people cannot smell, or does not smell the same thing that other people smell;
- gustatory experiences – the person tastes things that are not present.

3) **Disorganised speech.** Disorganised speech may include frequent derailment, or incoherence, and may be referred to as "word salads". The person's speech is characterised by ongoing and disjointed or rambling monologues where the person appears to be talking to him or herself or imagined people or voices.

4) **Grossly disorganized or catatonic behaviour.** Disorganised or catatonic behaviour is an abnormal condition that is variously characterised by stupor or inactivity, mania, and either extreme flexibility or rigidity of the limbs.

5) **"Negative" symptoms of Schizophrenia.** These symptoms are characterised by the lack of important functional abilities. Some of these symptoms include:

- **Alogia.** Alogia is characterised by poverty of speech, and the lessening of speech fluency and productivity. This is thought to reflect slowing or blocked thoughts, and is often manifested by short, empty replies to questions.
- **Affective flattening.** Affective flattening is the reduction in the range and intensity of emotional expression, including facial expressions, voice tone, and eye contact. The person may stare, and doesn't maintain eye contact, and is not able to interpret body language or use appropriate body language.
- **Avolition.** Avolition is the reduction, difficulty, or inability to initiate and persist in goal-directed behaviour, and it is often mistaken for apparent disinterest. The person may no longer be interested in going out and meeting with friends, not interested in activities that they used to show enthusiasm for, and not be interested in much of anything, resulting in, for example, sitting at home for many hours of the day doing nothing.

A short summary list of negative symptoms is:

- lack of emotion – the person has an inability to enjoy regular activities (e.g., visiting with friends, etc.) as much as they did before;
- low energy – the person tends to sit around and sleep much more than normal;
- lack of interest in life, and low motivation;
- affective flattening – a blank, blunted facial expression or less lively facial movements, or flat voice (e.g., a lack of normal intonations and variance) or physical movements;
- alogia – the difficulty or inability to speak;

- inappropriate social skills or a lack of interest or ability to socialise with other people;
- an inability to make friends or keep friends, or not caring to have friends;
- social isolation – the person spends most of the day alone or only with close family.

Note: Only one Criterion A symptom is required if the delusions are bizarre, or if the hallucinations consist of a voice that maintains a running commentary on the person's behaviour or thoughts, or two or more voices conversing with each other.

Cognitive Symptoms of Schizophrenia

Cognitive symptoms refer to difficulties the person has with concentration and memory. These symptoms can include:

- disorganized thinking
- slow thinking
- difficulty understanding
- poor concentration
- poor memory
- difficulty expressing thoughts
- difficulty integrating thoughts, feelings and behaviour.

Criterion B: social/occupational dysfunction

For a significant portion of the time since the onset of the disturbance, one or more major areas of functioning (e.g., such as work, interpersonal relations, or self-care) are markedly below the level achieved prior to the onset. When the onset is in childhood or adolescence, dysfunction may be a failure to achieve expected level of interpersonal, academic, or occupational achievement.

Criterion C: duration

Continuous signs of the disturbance persist for at least six months. This six month period must include at least one month of symptoms (or less if successfully treated) that meet Criterion A (i.e., the active-phase symptoms) and may include periods of prodromal or residual symptoms. During these prodromal or residual periods, the signs of the disturbance may be manifested only by negative symptoms, or two or more symptoms listed in Criterion A that are present in an attenuated form (e.g., odd beliefs, unusual perceptual experiences).

Criterion D: Schizoaffective and Mood Disorder exclusion

Schizoaffective disorder and mood disorder with psychotic features have been ruled out because either: (i) no major depressive, manic, or mixed episodes have occurred concurrently with the active-phase symptoms; or (ii) if mood episodes have occurred during active-phase symptoms, and their total duration has been brief relative to the duration of the active and residual periods.

Criterion E: substance/general medical condition exclusion

The disturbance is not due to the direct physiological effects of a substance (e.g., alcohol or other drugs, or a medication) or a general medical condition.

Criteria F: relationship to a Pervasive Developmental Disorder

If there is a history of autistic disorder or another pervasive developmental disorder, the additional diagnosis of schizophrenia is made only if prominent delusions or hallucinations are also present for at least a month (or less if successfully treated).

7.1.5 Manic Episode

Criterion A

A distinct period of abnormally and persistently elevated, expansive, or irritable mood, lasting at least one week, or any duration if hospitalisation is necessary.

Criterion B

During the period of mood disturbance, three or more of the following symptoms have persisted (or four if the mood is only irritable) and have been present to a significant degree:

- an inflated self-esteem or grandiosity;
- a decreased need for sleep (e.g., feels rested after only three hours of sleep);
- more talkative than usual, or pressure to keep talking;
- flight of ideas, or the subjective experience that thoughts are racing;
- distractibility – that is, attention is too easily drawn to unimportant or irrelevant external stimuli;
- an increase in goal-directed activity, either socially, at work or school, or sexually, or psychomotor agitation;
- an excessive involvement in pleasurable activities that have a high potential for painful consequences – for example, engaging in unrestrained buying sprees, sexual indiscretions, or foolish business investments.

Criterion C

The symptoms do not meet criteria for a Mixed Episode.

Criterion D

The mood disturbance is sufficiently severe to cause marked impairment in occupational functioning or in the person's usual social activities or relationships with others. Or, the mood disturbance is sufficiently severe to necessitate hospitalization to prevent harm to self or others, or there are psychotic features present.

Criterion E

The symptoms are not due to the direct physiological effects of a substance; for example, alcohol or other drugs, a medication, or other treatments (e.g., herbal remedies), or a general medical condition (e.g., hyperthyroidism).

Note: Manic-like episodes that are clearly caused by somatic antidepressant treatment – for example, medication, electroconvulsive therapy, or light therapy – should not count toward a diagnosis of Bipolar I Disorder.

10 APPENDIX II

Table A1. Demographic characteristics at baseline for participants lost to follow-up at three and twelve months

	Percent lost to follow-up at three months (%)	p value	Percent lost to follow-up at 12 months (%)	p value
	(N = 19)		(N = 25)	
Age (median years)	30	n.s.	29	n.s.
Schooling (median years)	10	n.s.	10	n.s.
Net income (median, past fortnight)	$400	n.s.	$420	0.028
Gender		0.059		n.s.
Female (n = 28)	7		14	
Male (n = 72)	24		29	
Country of birth		n.s.		n.s.
Australia (n = 93)	18		25	
Other (n = 7)	29		29	
Tertiary education		n.s.		n.s.
No courses (n = 45)	22		31	
Trade/technical (n = 47)	19		21	
University/college (n = 8)	-		13	
Unemployed at baseline		n.s.		n.s.
No (n = 14)	14		14	
Yes (n = 86)	20		27	
Arrest history		n.s.		0.018
No (n = 31)	13		10	
Yes (n = 69)	22		32	

Table A1. Continued

	Percent lost to follow-up at three months (%) (N = 19)	p value	Percent lost to follow-up at 12 months (%) (N = 25)	p value
Prison history		0.075		0.065
No (n = 74)	15		20	
Yes (n = 26)	31		39	
Living arrangements at baseline				
Alone		n.s.		n.s.
No (n = 82)	20		22	
Yes (n = 18)	17		39	
Partner/spouse/de-facto		n.s.		n.s.
No (n = 77)	22		26	
Yes (n = 23)	9		22	
Parents		n.s.		n.s.
No (n = 76)	17		29	
Yes (n = 24)	25		13	
Non-related adults		n.s.		n.s.
No (n = 67)	21		27	
Yes (n = 33)	15		21	
Siblings/other relatives		0.004		n.s.
No (n = 88)	15		23	
Yes (n = 12)	50		42	

Table A1. Continued

	Percent lost to follow-up at three months (%) (N = 19)	p value	Percent lost to follow-up at 12 months (%) (N = 25)	p value
Housing		n.s.		n.s.
Public (n =2)	50		100	
Privately rented (n = 44)	9		25	
Privately owned (n = 11)	27		27	
Parent's home (n = 25)	24		12	
Boarding house (n = 4)	25		25	
No fixed address (n = 11)	18		36	
Other relative's home (n = 3)	67		33	
Marital status		n.s.		n.s.
Single (n = 71)	21		25	
Married or de facto (n = 19)	11		37	
Separated/divorced (n = 10)	40		-	
Had children		n.s.		n.s.
No (n = 53)	23		21	
Yes (n = 47)	15		30	
Currently living with dependent children		p =0.042		n.s.
No (n = 87)	22		27	
Yes (n = 13)	-		13	

Note: Non-significant differences (p>0.10) are denoted by n.s.

Table A2. Drug use at baseline for participants lost to follow-up at three and twelve months

	Percent lost to follow-up at 3 months		p value	Percent lost to follow-up at 12 months		p value
	Yes (n = 19)	No (n = 81)		Yes (n = 25)	No (n = 75)	
Drug use history (median age in years)						
First intoxication	13	13	n.s.	13	13	n.s.
First methamphetamine use	16	17	n.s.	17	17	n.s.
Methamphetamine dependence onset	21	20	n.s.	23	20	n.s.
Methamphetamine use duration (median years)	11	9	n.s.	11	9	n.s.
Methamphetamine use in the month before treatment						
OTI score (past month, median)	1 (0.5)	2	0.042	2	1.5	n.s.
SDS score (past month, median)	9	10	n.s.	9	10	n.s.
Days used (past month, median)	10	16	n.s.	16	16	n.s.
Number of drug classes used at baseline (median)						
Lifetime	10	10	n.s.	10	10	n.s.
Past year	6	7	0.021	6	7	0.091
Past month	5	5	n.s.	5	5	n.s.
Ever injected methamphetamine			n.s.			n.s.
No (n = 16)	6	94		19	81	
Yes (n = 84)	21	79		26	74	
Main route of administration in month before treatment			n.s.			n.s.
Inject (n = 69)	23	77		25	75	
Smoke (n = 18)	6	94		28	72	
Snort (n = 1)	-	100		-	100	
Swallow (n = 10)	10	90		90	70	

Note: Non-significant differences (p>0.10) are denoted by n.s.

Table A3. Psychiatric comorbidity at baseline by participants lost to follow-up at three and twelve months

	Percent lost to follow-up at three months (%) (N = 19)	p value	Percent lost to follow-up at 12 months (%) (N = 25)	p value
Major Depression at baseline (past year)		n.s.		n.s.
Met DSM-IV criteria (n = 44)	18		23	
Substance-Induced Depression (n = 45)	16		22	
No or sub-clinical symptoms (n = 11)	36		46	
Social Phobia at baseline (past year)		0.036		n.s.
Met DSM-IV criteria (n = 31)	19		19	
Substance-Induced Social Phobia (n = 22)	9		18	
No or sub-clinical symptoms (n = 47)	36		19	
Panic Disorder* at baseline (past year)		n.s.		n.s.
Met DSM-IV criteria (n = 31)	23		23	
Substance-Induced Panic Disorder (n = 10)	10		10	
No or sub-clinical symptoms (n = 59)	19		29	
Lifetime psychosis		n.s.		n.s.
No (n = 17)	18		35	
Yes (n = 83)	19		23	

Table A3. Continued

	Percent lost to follow-up at three months (%)	p value	Percent lost to follow-up at 12 months (%)	p value
	(N = 19)		(N = 25)	
Symptoms of psychosis at baseline (past month)		0.050		0.056
Suspiciousness	14		20	
No (n = 71)	31		38	
Yes (n = 29)				
Unusual thought content		0.099		
No (n = 73)	15		23	n.s.
Yes (n = 27)	30		30	
Hallucinations (n = 23)		n.s.		n.s.
No (n = 79)	18		25	
Yes (n = 23)	22		26	
Any psychotic symptom (n = 47)		n.s.		n.s.
No (n = 53)	17		23	
Yes (n = 47)	21		28	
Hostility at baseline (past month)		n.s.		0.083
No (n = 25)	16		12	
Yes (n = 75)	20		29	

Note: Non-significant differences (p>0.10) are denoted by n.s.